BBC · MASTER · ELECTRON · A3000 · ARCHIMEDES NOVEMBER 1990 £1.60

BBC ACORN USER

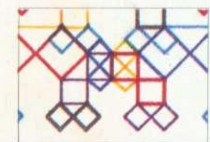


We look back over 100 issues



OVATION DTP

We take a look at Beebug's latest desktop publishing package



PLOTTER POWER

Transfer the Beeb screen output to paper with our HPGL program



PICPAC

Try this exciting DIY graphics package for the Electron

WHAT'S NEXT

CD-Rom the future of data storage

WIN £5000 of Acorn kit must be won





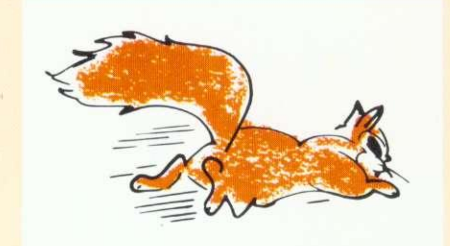
SQUIRREL



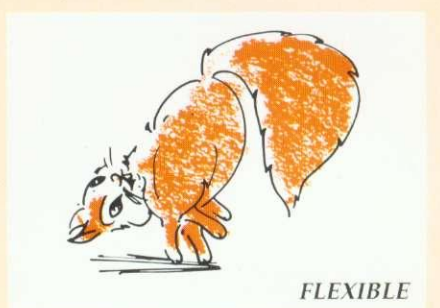
THE REVOLUTIONARY NEW DATABASE FOR ARCHIMEDES COMPUTERS



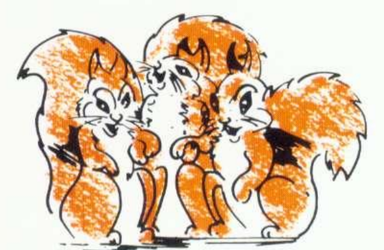
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Modern indexing techniques mean superfast searches every time.



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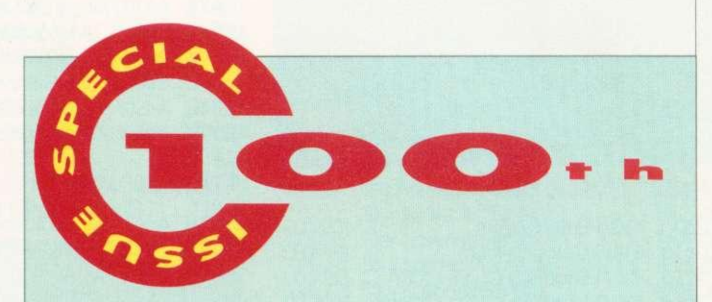
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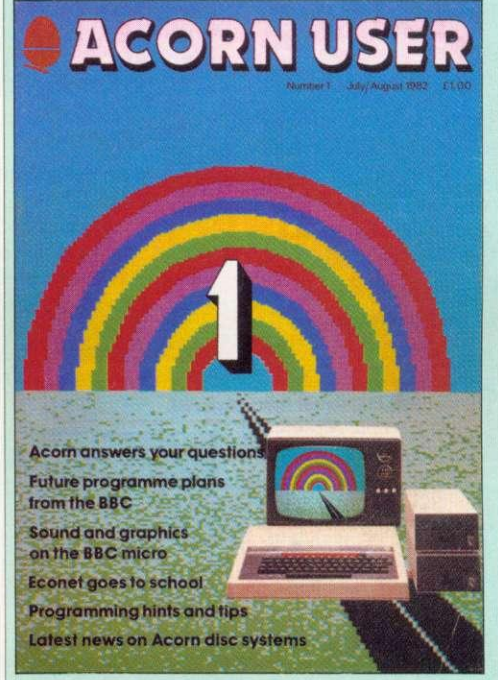
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BBC ACORN USER

NOVEMBER 1990 ISSUE No 100





Available from **BEEBUG** *for the Archimedes and A3000*

ovation

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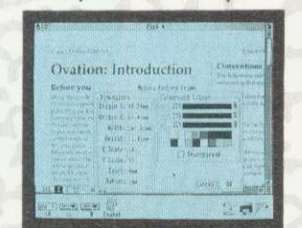
Ovation provides a single solution to all of your desktop publishing and word processing needs. Combining the most useful and powerful features from DTP systems costing much more, you will find Ovation has just about everything you could want. Ask your dealer for a demonstration – you won't be disappointed.

Text Editing

Text may be typed in straight away just like a word processor, without the need for any complicated frames or styles. When a page is full, text will simply flow onto the next page. In addition you may add any number of frames to the page, each with its own 'story'. Frames may be linked together causing the 'story' to flow from frame to frame.

Adding Style

A 'style' is the font, size, justification, leading, indent etc. of a piece of text. Ovation allows any number of styles to be defined, named and then applied to paragraphs at the press of a key. Styles may be re-defined at any time, and the changes will automatically flow through the entire document. In addition, local styles may be applied to any highlighted block by simply selecting the font, size, style and format from the menus.



Frame Handling

Ovation has many advanced frame features, such as linked text frames with auto-flow, repel text, definable frame borders and a step-and-repeat facility. Unique on the Archimedes, is our parent/child system for frames and lines. This system allows you to copy and paste frames with embedded child frames and lines, as single items. This allows diagrams, forms, tables etc. to be copied or moved with ease.

The Instinctive DTP

Ovation is supplied with a tutorial and complete user guide, although you probably won't need to refer to it very often. Ovation makes full use of the RISC OS multi-tasking environment to provide a formidable array of features that are easy to learn and instinctive to use. A quick reference card is also included, which lists all the keyboard and mouse short cuts.

Other Features

- Multi-tasking/multi-documents
- No hardware protection
- Full WYSIWYG display with variable view
- Fast built-in spelling checker (requires 2Mb)
- Printer drivers for Epson, PostScript, LaserJet, and Integrex printers
- Import Draw and Sprite files. Features include: scale, crop, fit-to-frame
- Master pages for each chapter
- Cut/copy/paste using clipboard
- Multiple columns
- Find and replace
- Automatic headers and footers
- Supplied with 4 outline fonts (13 faces)
- Variable (& fractional) font sizes 1pt to 500pt
- Supports coloured text, frames and borders
- Stylesheets and customised start-up
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- Supplied with full range of clipart
- Variable size, style and colour lines
- Manual and auto hyphenation (requires 2Mb)

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Excellent Value

At only £99 plus VAT Ovation represents better value for money than any other DTP on the Archimedes/A3000. But don't be mislead by price. We are confident you will be impressed, and offer a full refund if not completely satisfied. Educational discounts and site licences are available.

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If you wish to order directly, cheques, credit cards and official orders are all welcome.

WORKSTATION REALITY WITH BBC A3000

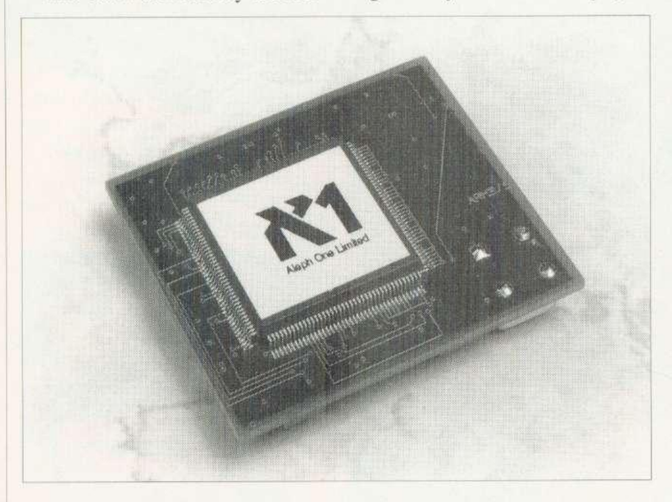
Recent developments among third-party peripheral manufacturers will turn the BBC A3000 into a low-cost workstation.

Acorn released the A3000 as a cut-down version of the 300 and 400 series, with limited expansion in mind. This has not stopped companies such as Aleph One, Pres, Atomwide and Ian Copestake Software, all of whom were exhibiting at this year's *BBC Acorn User* show.

The products include an internal hard disc drive, a surface mount Arm3 and 4Mb memory expansion boards. With all the expansion options, you could have an A3000-based workstation with 4Mb of Ram, a 30Mhz Arm3 and a 20Mb internal hard disc for just over £2000 – much less than similar expansion options on a 400 series machine.

The 20Mb internal hard disc drive from Ian Copestake Software is called the ideA, and is a 2.5in drive which is fitted on shock absorbent pillars on top of the ideA podule/interface.

The drive is currently used in a number of portable computers and features low power consumption and a programmable facility to turn the drive off when not in use. The auto-parking facility of the drive physically lifts the read/write head off the disc when power is off.



According to Ian Copestake, the drive meets Acorn requirements for the amount of power it draws from the A3000, and one or more fans will ensure that heat is dissipated. Currently a 20Mb version is on offer at around £460 and a 40Mb version will be available soon.

Aleph One has recently introduced a new version of its Arm3 processor. A smaller version has been made by using surface mount technology. The Aleph One SMT upgrade uses a single four-layer printed circuit board. It is just over 50mm on a side and 12mm thick.

The company is offering its SMT upgrade at £512 for a 30Mhz version and hopes to sell a 33Mhz later this year.

The size of the new upgrade means that it's possible to fit it into an A3000. Aleph One is currently negotiating with Acorn regarding the preservation of warranties on an A3000 upgraded this way, as soldering is required. A dealer upgrade fitting service will be offered.

Atomwide is selling 1Mb and 4Mb Ram upgrades for the A3000, compatible with the Aleph One SMT Arm3 board.

1Mb upgrades are available at £86, but no price is given for 4Mb as chip prices are falling.

Ram upgrades for the A3000 are also available from Watford Electronics and Pres (which sells a plinth system for the A3000).

Ian Copestake Software is on 051-648 6287. Aleph One is on (0223) 811679. Atomwide is on (0689) 38852.

SNIPPET

In June, *BAU* received a review copy of *Snippet* from 4Mation Educational Resources.

One of *BAU*'s freelance reviewers, without the permission of the publishers, removed a screen-freezing section of this program for his own use.

A complete copy of *Snippet* was also given to a visitor to our stand at the *BAU* show in the mistaken belief that it was public domain software.

We would like to point out that it is not the policy of this magazine to breach copyright on software sent to us for review.

We would ask anyone possessing either the screen-freezing utility, or a complete copy of *Snippet* showing 'ID, *BBC Acorn User*' at the top of the screen, to destroy them immediately, in order to avoid breaching copyright.

BAU has apologised to 4Mation and has satisfied the company as to the security of any future software sent for review.



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'Under the Lid' — hardware series
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400 SERIES PRICE CUTS

Following the launch of the A540 at £2995, Acorn Computers has announced price cuts for the Archimedes 400 series.

The largest reduction relates to the 440/1 which was £2099, and now sells for £1699 – a saving of £400. The 420/1 has been reduced to £1299 from £1499, a saving of £200.



The £1299 price of the 420/1 is the same as Advanced Learning Curve, which comes with a 420/1 and bundled software.

Acorn announced no price reduction on the A3000, which retails for £599, but see page 10 for details of a new package. All prices quoted are ex VAT.

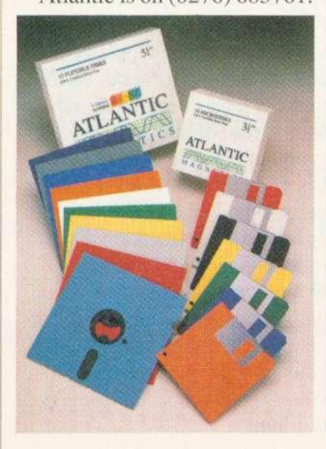
Acorn is on (0223) 245200.

COLOUR DISCS

Irish disc makers, Atlantic Magnetics, has produced a range of 5.25in discs which are available in any Pantone colour. The company also offers 3.5in discs in 10 colours including smooth matt white.

The company also produces a ten-pack library case – available in five colours.

Atlantic is on (0276) 685761.



ROCK STEADY MONITOR

Taxan has released a 14inch auto-scanning monitor which gives excellent results when used with an Archimedes.

The Multivision 795 incorporates a Trinitron cylindrical screen that produces straighter lines than a conventional monitor with a vertically flat screen surface. The Trinitron black screen also increases contrast by 50 percent, and an aperture grille with long slits results in vivid colour images.



The monitor (which will be reviewed in a later issue) is expected to sell at less than £500. First seen at the *BAU* show, the 795 gives excellent results when used with an Archimedes. The monitor has a 0.26mm pitch and can display a non-interlaced pixel resolution of up to 1024x768.

Taxan is on (0344) 484646.

● Hitachi has released a 14in multi-frequency monitor called the 14 MVX. The monitor features refresh rates of up to 100Hz, and a tilt and swivel base. Price on application. Hitachi is on 081-569 5511.

BAU SHOW REPORT

The Westminster Exhibition Centre was the place to be between 7 and 9 September.

Thousands of people attended what must have been the best *BBC Acorn User* show to date.

Acorn took the opportunity to launch its new Archimedes A540 which drew large crowds throughout the entire show.

The company also launched the Advanced Learning Curve and gave several talks on Acorn-related subjects.

Indeed, the show was not only a venue to look and buy, but look and listen. The seminars were as popular as ever, featuring key figures giving 15 lectures over the three-day period, on subjects ranging from the National Curriculum to computer communications.



It was, without a doubt, a show for the Archimedes user. Upgrading in particular was the order of the day with numerous add-ons available for the 300 and A3000 series.

Arm3 upgrades were available from no fewer than four companies, with speeds ranging from 20 to 40Mhz.

The push-and-shove of previous shows was avoided by increased size of the isles. This gave exhibitors the opportunity to give show-goers more detailed demonstrations of their products.

Having said that, visitors were said to be spending heavily and at the close of the show, some exhibitors had very little to pack away.

The editorial team and freelance contributors of *BAU* enjoyed meeting many of our readers.

We hope you enjoyed your visit, and look forward to seeing you at next year's show. Keep an eye on *BBC Acorn User* for more details.

NEWS IN BRIEF

● OllySoft PD is a new public domain library for the Archimedes user. The organiser claims to have megabytes of Archimedes software. The cost is £2 for the first disc, and £1 for each disc thereafter. Customers must send their own discs and return postage.

Ollysoft PD can be contacted at 4 Kemptown Place, Brighton, Sussex.

● Silicon Vision has released a new Risc OS multi-tasking version of the Logo programming language.

***RoboLOGO* costs £100 and features extensions to the original language with 'natural' commands such as walking, turning, bowing, which are represented graphically.**

Silicon Vision is on 081-861 2173.

● Topologika has released *Astronomy*, a set of interactive programs for exploring space. The seven graphic programs and planet database files allow the user to ask questions, whose answers are graphically represented.

DIARY DATES

***October 20.* Big Ben Club Open Day, Community Centre De Kiekmure, Tesselschadelaan 1, Harderwijk, Netherlands. Activity groups for education, genealogy and Dos Plus. Contact: Harry Linsen, Gommerskerspel 24, 2151 RA NIEUW-VENNEP, Netherlands. Tel: (31)2526-72385 (evenings).**

***November 4 and December 2.* Watford Open Day, Lower High Street, Watford, Herts. Contact: Watford Electronics on (0923) 37774.**

***November 25.* Beebug Open Day, 117 Hatfield Road, St Albans, Herts AL1 4JS. Tel: (0727) 40303.**

***December 6-9. Computer Shopper* 1990 Show, Wembley Conference Centre, London. Contact: Cape Cowley Associates on 061-480 9811.**

ACORN JETS HOME



ZCL, one of the leading distributors for Commodore and Amstrad products, has launched a new home entertainment package based around the A3000.

Timed for the pre-Christmas market, the package – called Jet Set – retails at £747.50 and is being distributed through independent dealers at first.

As well as an A3000, the package includes a specially-designed TV modulator (allowing it to connect to any TV set) and £200 of software, including:

● Clare's *Interdictor* flight simulation package.
● Ace Computing's *Euclid* 3D modelling package.
● *Trivial Pursuit* from Domark.
● *Superior Golf*
● *!Paint*, *!Edit*, *!Draw* and *!Maestro*.

According to ZCL's Don Carter, the company has been advising Acorn about the kind of package that would be needed to break into the home entertainment/leisure market. 'We are all aware that the A3000 is an excellent machine,' he told *BAU*, 'but we had to achieve a competitive price and enlist the co-operation of the software houses. That done, we feel we have a superb package which will expand awareness of Acorn in the home computing market.'

While not revealing the number of units shipped, Carter called it 'the biggest project Acorn has recently been involved in – running into thousands.'

Crucial to the package is the TV modulator, which ZCL spent some time perfecting. Designed to work with any TV set, Carter claims it produces monitor quality which impresses Acorn considerably.

Commenting on Jet Set, Bob Coates, Acorn's consumer division said: 'We are very excited about this deal with ZCL. We are strongly focused on spreading the Acorn name wider and ZCL can help us achieve this. We see this as the first of many initiatives.'

PLOTTER POWER

Hard Copy Ltd, the sole UK agent for Sekonic plotters, has released a new A3 flatbed plotter in its SPL range.

The eight-pen SPL 460 has a drawing speed of 55cm/sec, with a pen-up speed of 77cm/sec. The 460 has a mechanical resolution of 0.00625mm, and is HPGL compatible.

The 460 costs £862.50, and is aimed at those needing a high degree of plotting resolution due to its high mechanical accuracy.

● Hard copy also sells the SPL450, one of the cheapest A3 eight-pen flatbed plotters at £632.50. It has centronic and parallel interfaces, HPGL compatibility and magnetic-strip hold down for media. Hard Copy is on (0306) 76402.



ACORN AT THE SHOPPER SHOW

Following its success at the *BBC Acorn User* show, Acorn will be giving readers another chance to browse through its latest wares at this year's *Computer Shopper* show.

The event takes place at the Wembley Conference Centre



from Thursday December 6 to Sunday December 9. Besides an Acorn village, there will be 14 Acorn related seminars throughout the four-day show covering topics such as CD-Rom, image processing, hypermedia, desktop publishing, music and education. Many other topics are covered and visitors can register to attend at the Acorn stand.

On the show front, the Acorn village will have a number of third party suppliers and *Genesis 2* is promised to have its first public showing.

Acorn is also offering valuable discount vouchers.

For more show details, contact Don Lewis, Cape Cowley Associates, on 061-480 9811.

SORRY

● We apologise to subscribers for the delay in receiving the October issue, which came with the Arc Business supplement.

Unfortunately, some of the address labels became detached during the packing process. The problem has now been resolved, but if subscribers have not received their copies they should contact our subscription department on (0937) 842489.

● We don't know how (and we're sticking to our story), but a line 198 found its way into listing one of October's Risc Revue. Delete it and the program will run.

Monitor Stand

Bridge Unit

3.5" Floppy Drive

5.25" Floppy Drive

SCSI Hard Drive

Tape Streamer



The new Oak A3000 expansion system is the perfect partner for the A3000 computer. The monitor stand forms the base of the expansion system and is also available separately. The stand bridges the A3000 whilst still allowing access to the mains switch, disc drive and reset button.

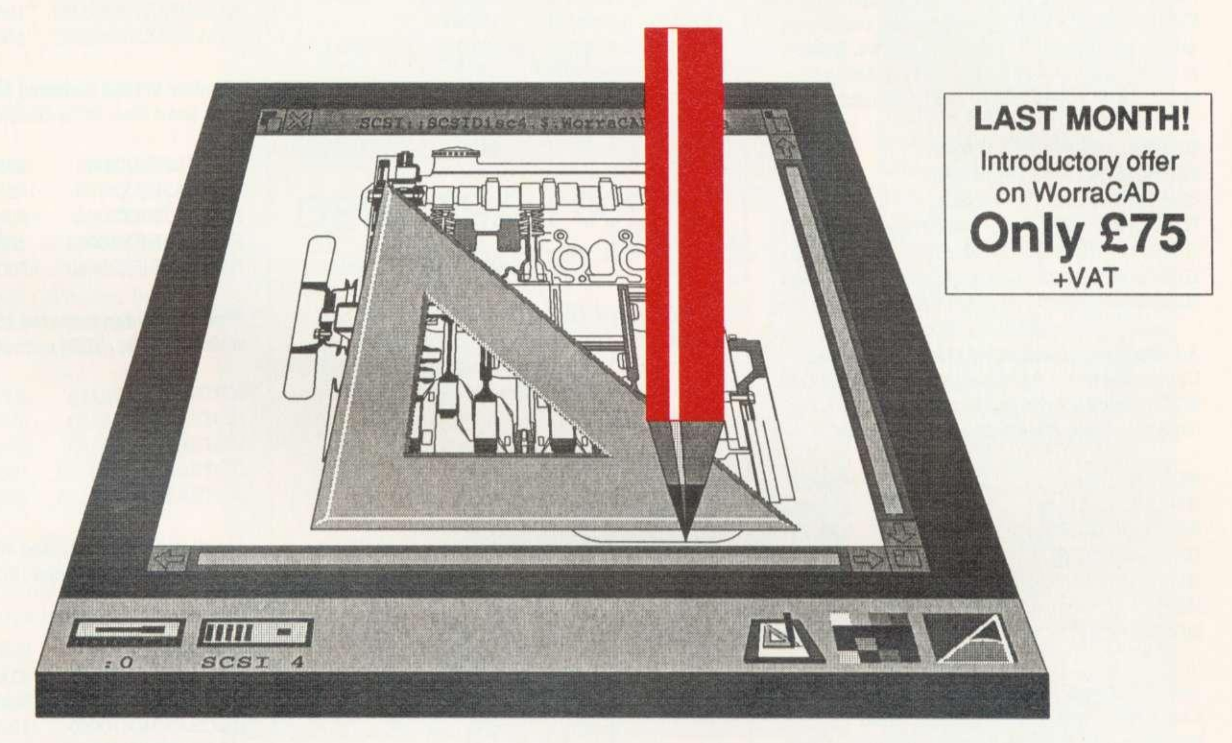
The expansion bridge provides scope for a wide range of add-ons with provision for a 5.25" and a 3.5" floppy drive, up to 400Mb of SCSI winchester storage, or a tape streamer instead of the 5.25" drive.

As with all Oak hardware products, the A3000 expansion range is manufactured under our 'zero defect' quality control regime to ensure the ultimate in quality and reliability.



A3000
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Turn your desktop into a drawing board



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£25 + VAT (1 off) £20 + VAT (2 or more)

RibaCAD Architectural library: Approximately 50Mb of library drawings available at cost of media plus documentation!

For further information contact your authorised Oak dealer or contact Oak direct at
Cross Park House Low Green Rawdon Leeds LS19 6HA Tel: 0532 502615 Fax: 0532 506868

SCSI HARD DISCS
HIGH SPEED RANGE

Internal SCSI Hard Disc with Controller Card for all Archimedes 310/400 series computers. Complete with controller card, drive unit, chassis, backplates, 'T' piece, all screws and cables.

HDINARC20SC	20Mb	375.00
HDINARC45SC	45Mb	495.00
HDINARC80SC	80Mb	699.00
HDINARC100SC	100Mb	925.00
HDINARC200SC	200Mb	1299.00

External SCSI Hard Disc with Controller Card for all Archimedes 310/400 series computers. Comes complete with controller card, connecting cables, backplates, 'T' piece and screws. Housed in a metal case colour matched to the Arc. with switch mode power supply and DC brushless fan.

HDEXARC20SC	20Mb	535.00
HDEXARC45SC	45Mb	655.00
HDEXARC80SC	80Mb	859.00
HDEXARC100SC	100Mb	1085.00
HDEXARC200SC	200Mb	1459.00
HDEXARC300SC	300Mb	2375.00
HDEXARC512SC	512Mb	2995.00

Additional External SCSI Hard Disc Drive. Up to 3 additional drives can be added to the Oak SCSI controller making 4 hard discs in total. For the Archimedes A3000, 310 and 400 series.

HDEXARC20SCA	20Mb	435.00
HDEXARC45SCA	45Mb	555.00
HDEXARC80SCA	80Mb	759.00
HDEXARC100SCA	100Mb	985.00
HDEXARC200SCA	200Mb	1359.00
HDEXARC300SCA	300Mb	2275.00
HDEXARC512SCA	512Mb	2895.00

A3000 External Hard Disc Drive with Controller Card. Comes complete with controller card housing, connecting cables. Drive unit housed in metal case, colour matched to the A3000 with switch mode power supply and DC brushless fan.

HDA3EX20SC	20Mb	535.00
HDA3EX45SC	45Mb	655.00
HDA3EX80SC	80Mb	859.00
HDA3EX100SC	100Mb	1085.00
HDA3EX200SC	200Mb	1459.00
HDA3EX300SC	300Mb	2375.00
HDA3EX512SC	512Mb	2995.00

REMOVEABLE HARD DISCS

Removeable high speed cartridge hard disc drives (real hard discs, not slow bernoulli type) Housed in a metal case colour matched to the Arc. with switch mode power supply and DC brushless fan. 42 megabytes capacity per cartridge. One cartridge included in price. 'SC' denotes card included, 'SCA' denotes card excluded.

RDEXARC42SC	A310,A400	995.00
RDA3EX42SC	A3000	995.00
RDEXARC42SCA	A310,A400	895.00
RDA3EX42SCA	A3000	895.00
RD42CART	disc cartridge	99.00

SCSI TAPE STREAMERS

SCSI Tape Streamer with desktop software to allow easy and versatile backing up and restoring of data from SCSI and ST506 winchesters, networks etc. Comes complete with all cables. Housed in a metal case colour matched to the Archimedes with switch mode power supply and DC brushless fan. TS range uses DC600 type ¼" cartridge units, whilst the new cost effective CS range utilise 1/8" cassette style tape cassettes.

TS60SC (inc card)	60Mb	1099.95
TS150SC (inc card)	150Mb	1354.00
TS60SCA (exc card)	60Mb	999.95
TS150SCA (exc card)	150Mb	1254.00
CS60SC (inc card)	60MB	895.00
CS60SCA (exc card)	60Mb	795.00
TAPE60 cartridge	60Mb	24.95
TAPE150 cartridge	150Mb	27.95
CASS60 cassette	60Mb	24.00

ST506 HARD DISC DRIVES

Archimedes A410 Internal Hard Disc Drives for use with 'on- board' ST506 winchester controller. Come complete with mounting chassis, screws, connecting cables and easy to follow fitting instructions.

HDINARC20ST	20Mb	199.00
HDINARC40ST	40Mb	315.00
HDINARC47ST	47Mb	399.00
Add on drives for SJ Fileserver		POA



A3000 EXPANSION

Monitor stand, steel construction, finished in powder coat paint coloured to match the A3000.

A3E10	21.00

A3000 External Monitor Bridge Mounted SCSI Hard Disc Drive with Controller Card. Comes complete with controller card housing, connecting cables. Drive unit housed in monitor bridge, colour matched to the A3000 with switch mode power supply and DC brushless fan.

HDA3BEX20SC	20Mb	565.00
HDA3BEX45SC	45Mb	685.00
HDA3BEX80SC	80Mb	889.00
HDA3BEX100SC	100Mb	1115.00
HDA3BEX200SC	200Mb	1489.00

Monitor bridge mounted floppy drive, complete with buffer card, cable & PSU

FDA3B35	3.5"	249.00
FDA3B525	5.25"	259.00

Monitor bridge mounted hard disc with 3.5" floppy drive, floppy disc buffer card, SCSI card, PSU & cables

HDA3BEX2035SC	20Mb	698.00
HDA3BEX4535SC	45Mb	818.00
HDA3BEX8035SC	80Mb	1022.00
HDA3BEX10035SC	100Mb	1248.00
HDA3BEX20035SC	200Mb	1622.00

Monitor bridge mounted hard disc with 5.25" floppy drive, floppy disc buffer card, SCSI card, PSU & cables

HDA3BEX20525SC	20Mb	708.00
HDA3BEX45525C	45Mb	828.00
HDA3BEX80525SC	80Mb	1032.00
HDA3BEX100525SC	100Mb	1258.00
HDA3BEX200525SC	200Mb	1632.00

Monitor bridge mounted 60Mb tape streamer with hard disc, SCSI controller card & PSU

HDTSA3BEX2060	20Mb	1595.00
HDTSA3BEX4560	45Mb	1715.00
HDTSA3BEX8060	80Mb	1919.00
HDTSA3BEX10060	100Mb	2145.00
HDTSA3BEX20060	200Mb	2519.00

Monitor bridge mounted 150Mb tape streamer with hard disc, SCSI controller card & PSU

HDTSA3BEX20150	20Mb	1849.00
HDTSA3BEX45150	45Mb	1969.00
HDTSA3BEX80150	80Mb	2173.00
HDTSA3BEX100150	100Mb	2399.00
HDTSA3BEX200150	200Mb	2773.00

Monitor bridge mounted 60Mb cassette streamer with hard disc, SCSI controller card & PSU

HDCSA3BEX2060	20Mb	1849.00
HDCSA3BEX4560	45Mb	1969.00
HDCSA3BEX8060	80Mb	2173.00
HDCSA3BEX10060	100Mb	2399.00
HDCSA3BEX20060	200Mb	2773.00

Bridge unit with 42Mb removable hard disc, SCSI controller card & PSU

RDA3BEX42SC	42Mb	1220.00

ARCHIMEDES SOFTWARE

PDT - Parametric Design Tool	359.00
PDT - Upgrade PDT release 1 to 2	45.00
PDT - Annual upgrade fee	45.00
WorraCAD - Risc OS 2D Draughting	75.00
WorraCAD Symbol Libraries (each)	25.00
Worra Plotter - Plotter driver for !Draw	29.95
Worra Battle - Real time 3D Tank Battle	14.95

All prices exclude VAT and delivery

Delivery charges :

External Hard Discs/Tape Streamers	15.00
Internal Hard Discs	10.00
SCSI Card	3.50
Software	1.00

Education price list available on request.

For further information contact your nearest authorised Oak dealer or contact Oak direct at:

Cross Park House
Low Green
Rawdon
Leeds
LS19 6HA

Tel: 0532 502615
Fax: 0532 506868





STAR GAZING

Spacetech used September's *BBC Acorn User* show to launch *!Orrery**, an exciting computerised model of the solar system which will be invaluable for fulfilling AT16 of the science National Curriculum, covering the Earth in space.

The model is accurate enough to demonstrate all important aspects of astronomical phenomena, and provides breathtaking views of the galaxy.

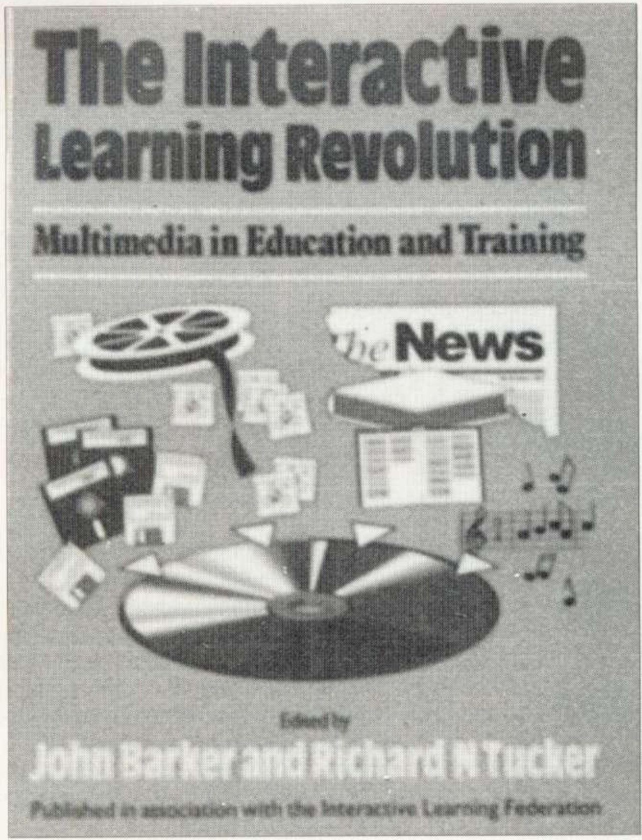
Not only can it be used for demonstration purposes, but it is an interactive tool giving accurate astronomical data for any time and date within a realistic time frame (about 4000 years).

Features include animated orbits in real, preset or accelerated time; variable viewpoints and perspective; optional graphical outputs and interactive help.

Output – in the form of *!Draw*, *!Paint* or text files, so it is easily ported into other software packages – includes images of the orrery configuration, star maps and ephemeris charts.

!Orrery, runs on all Risc OS colour systems, although memory expansion is advised on 1Mb machines. It costs £109.95. Spacetech is at 21 West Wools, Portland, Dorset DT5 2EA.

*An orrery is a model of the solar system, usually clockwork, as invented by George Graham in the early 18th century. It was named after his patron, Charles Boyle, Fourth Earl of Orrery.



The Interactive Learning Revolution, edited by John Barker (of Inside IT fame) and Richard Tucker (ex-SCET, now with his own consultancy) is not a how-to-do-it-for-yourself book on the new technologies of multimedia. Rather, it is a compilation of different views on the impact multimedia is having, and is likely to have, on education and training. Published by Kogan Page (120 Pentonville Road, London N1 9JN), The Interactive Learning Revolution costs £18 in paperback (ISBN 0 7494 0091 9).

CURVACEOUS ARC

Acorn's principal launch at the *BAU* show was the A540, but also announced was an advanced Archimedes version of the Learning Curve package.

Based on the Archimedes 420/1, the bundle includes the usual range of software for family and school applications, a PC emulator, literature and a video. Also thrown in for the first time is the company's own *Acorn Desktop Publisher*.

The Archimedes Learning Curve is priced at £1494 inclusive and is available from specialist dealers and selected high street retailers.

RIGHT TO COPY?

In an attempt to clarify some of the issues surrounding copyright, NCET is organising a series of one-day workshops.

They will be run by Geoff Crabb, who is an acknowledged national expert on the subject, and the aim is to give teachers and anyone else working in education the understanding and confidence to deal with copyright problems.

Geoff will be tackling questions such as 'Can I record *Horizon* off-air to show to my class?', 'Is it permitted to make a back-up copy of software or to network it?' and 'If the law is broken, who is liable – me, the head or the local authority?'

The sessions this year are on October 25 and November 29 and next year on January 22, February 27 and March 21, in either Coventry or London.

The cost is £74.75, which includes a complimentary copy of the useful *Copyright Clearance: A Practical Guide*.

More details may be obtained from Diana Bourne, Conference Organiser, NCET, Sir William Lyons Road, Warwick University Science Park, Coventry CV4 7EZ.

Lisa Hughes

NEWS IN BRIEF

● Logo features heavily in the National Curriculum, even at key stages 1 and 2. Topologika has implemented *Tiny Logo* on the A3000, especially for young children.

Using the standard Archimedes mouse/pointer/icon system, children can enter commands without the keyboard. They can move commands into on-screen boxes where they are stored until the GO command is used.

Designs can be stored on disc, displayed and printed.

***Tiny Logo* costs £25 from Topologika, PO Box 39, Stilton, Peterborough PE7 3RL.**

● Hybrid Technology has published a survey covering nearly 60 of the most popular music software titles for the unexpanded BBC micro.

The 20-page booklet includes a description, price and supplier of each title.

***The Music Software Survey* costs £4.30 from Hybrid Technology, 273 The Science Park, Cambridge CB4 4WE.**

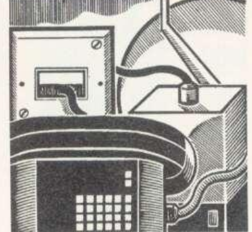
● Also of interest to users of the Hybrid Music System is a new book entitled *Play – The Performance Tutor for the Music 5000*.

Step-by-step, author John Bartlett takes users from beginners' topics such as note timing, phrasing and dynamics to advanced subjects like musical arrangement and orchestration.

Published by JB Software, 20 Crawley Avenue, Wellingborough, Northamptonshire NN8 3YH, the book costs £15.95 or £11.95 for a self-printing text file on disc.

● *Arclight* is a fast, multitasking ray tracing package for users Ace of Computing's *Euclid*. It uses ray tracing to produce high quality 3D pictures, similar to the quality of TV computer graphics.

This further addition to Ace's film-maker's toolkit costs £50. The company is at 27 Victoria Road, Cambridge CB4 3BW.



HALF-PRICE MODEMS

Pay attention BB, and would-be BB operators – I have news for you!

Those nice people who gave us the Hayes AT command set have announced one of those offers you cannot refuse.

Basically, Hayes Microcomputer Products is offering a 50 percent discount on its range of modems to existing and new bulletin board operators!

Here's how it works. You already have your BB, and you would like a new modem. Hayes will sell you one of its modems at 50 percent discount. There are a few conditions.

First, you must keep the modem operating on the board for one year.

Secondly, an ad must be displayed for one year stating what the modem is, and that you got it from Hayes.

Question: could you live with those pre-conditions? *I could*!

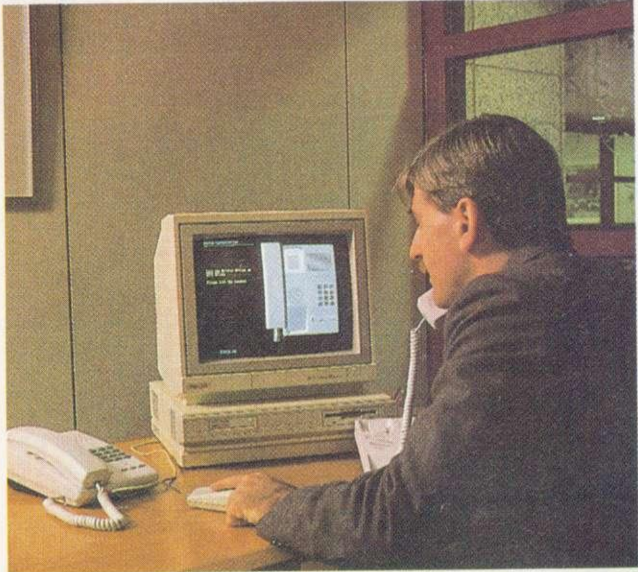
So, what's on offer. Well Hayes modems are good and they carry the Hayes standard.



Of course, the one item you should all be drooling over is the top-of-the-range Hayes Ultra 96.

At around £1200 its got the lot: v.32 (9600/9600), v.42 and v.42bis, plus MNP 5. Imagine owning that at £600!

For more information contact the Hayes Customer Service Department on 081-848 1858.



OK folks, it's what you've all been waiting for – the second BAU House Comms Column competition! A caption competition (as always), the prize will be comms-related and something small (as always). Here, we see a suit using a phone and playing about with a mouse. But why the picture of the phone on the screen? Why has he got two phones in the first place – I think we should be told! So, send in your witty entries by November 3. Entries will be accepted via Prestel, Gold or Interspan as well as snail mail.

INTERSPAN

BBC Acorn User is now hooked up to Interspan. The electronic mail service is operated by SJ Research (best known for its Econet fileservers).

Each member of the *BAU* team can be addressed by simply sending mail to them. The organisation name is BBC ACORN USER, and my given name is DAVID JANDA. The same applies for the editor, technical assistant, etc.

If you do not know what Interspan is, and are wondering what I am on about, then read the comms column over the next few months, as I shall be talking about it at length.

THE GOOD GUYS GUIDE

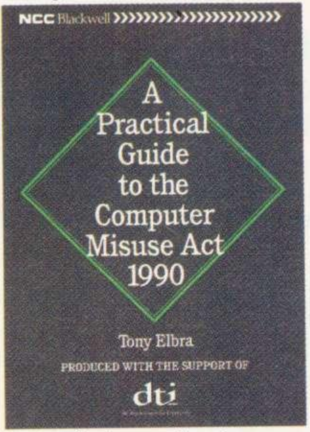
The Computer Misuse Act came into force on August 24. Since then much has been said about the act in the popular press, as well as on TV.

But what does it mean? And how does the act affect you, if at all?

The only clear answer anyone will get is when they are prosecuted under the new law – and even then solicitor double-talk can leave you wondering where you are.

The National Computing Centre Ltd and Blackwell have released *A Practical Guide to the Computer Misuse Act 1990*. Its objectives are to enlighten computer users by detailing what's what.

I suppose it could also serve as a guide to avoiding certain



areas of misuse – but then, you wouldn't use it for that, would you?

The guide costs £7.95. (ISBN 1 85554 077 0).

David Janda

NEWS IN BRIEF

● The Serial Port has released a new Risc OS version of *ArcTerm* by Hugo Fiennes, Sysop of The World of Cryton.

The new version doesn't yet support viewdata, but that's coming soon. I haven't managed to review the package, but people are telling me good things about it. The much improved package supports Ansi graphics and numerous file transfer protocols and could become a 'must' for Arc comms fans.

● Those nice people at Hi-Tec Modems cannot leave the design of the Hi-Tec modem alone. This time they've released the Hi-Tec EC2400 Deluxe Modem – with go-faster stripes!

Honest! It does have improved firmware, and will not freeze when accessing a v.42 host. The gang at Hi-Tec inform me they will be releasing a v.42/v.42bis version later this year, hopefully at the same price. That should give an effective throughput of 9600 baud under the right conditions.

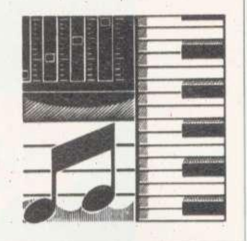
Hi-Tec is on (0733) 897333.

● Plug-time. Thanks to Simon Nash for dropping me a note about City Limits BB.

Simon is the Co-Sysop of said board. He says the system has a 20Mb hard disc and NFS software with zillions of BBC/Master 128 downloads. He hopes to open an Arc section soon and asks me to list the board number 'in your brilliant magazine'.

Certainly. City Limits is a viewdata board operating at 1200/75 baud on 081-504 4057 (data). It's ring-back, so call, let it ring once, hang up, then call again to log-on.

Please send comms news to David Janda at BBC Acorn User, or via Telecom Gold 81:RED001, Prestel 9199-92492, or Interspan; organisation BBC ACORN USER, given name DAVID JANDA.



TEACHING BY THE BOOK

Trevor Davies, a music teacher at Henry Box School in Oxford, has written with several comments.

He is planning an Inset course on music technology and asks why *Micro Musician* doesn't seem to get the coverage it deserves.

Micro Musician allows you to construct music compositions of up to eight parts on four staves and print them in high quality notation.

The basic version (£28.75) can only play back three parts but a MIDI compatible version can play back more with the aid of additional equipment.

You can extract individual parts and there is a 'letter in large note' option.

There are no transpose, copy or beam stem functions, but if you mask the tags you can draw them in by hand on the actual printout.

Trevor adds that it is a particularly useful tool for the quick preparation of classroom arrangements.

Perhaps one of the reasons it doesn't get much coverage is that it has dropped out of public sight and, to be honest, it can be rather complicated to use, especially by pupils.

Hybrid Technology has a *Micro Musician* set-up for the Music 5000 Universal and this will play back four parts.

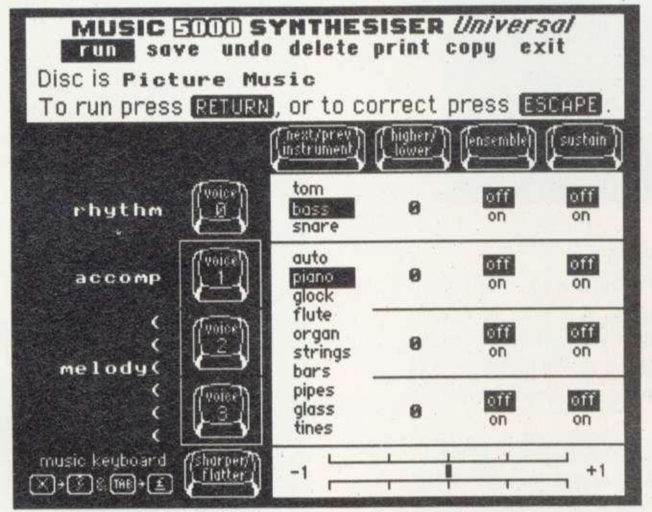
Contact Micro Musical at Cedar Lodge, Lutterworth Road, Bramcote, Nuneaton, Warwickshire CV11 6RB. Tel: (0455) 220922.

● Trevor also asked if there is a program for setting out chord charts for rhythm guitar.

I must say that I don't think there is.

However, there is a program called *Guitar Chords* from AVP Computing (For further details tel: (0291) 625439) but that only shows the chords and fingerings and doesn't let you print them out.

Can anyone help?



Hybrid's Music 5000 Universal plays back parts

MUSIC BOOKS

Over the past few months several readers have written to ask if there are any books to help develop programming skills in music.

There are a few I can definitely recommend.

Exploring Music with the BBC Micro and Electron by Kevin Jones (£9.95 from Pitman) is an excellent source of ideas for music programs, although as it supports the Electron, many of the examples only use one sound channel.

Topics include aural training, rules for computer-generated melodies, ethnic sounds, autorock and process music.

Creative Sound (£9.95) was published by Acorn and written by David Ellis and Chris Jordan. Chris actually designed the sound commands for the BBC micro and, as you might expect, this book pulls no punches in putting the chip through its paces.

Topics include sound effects, sequencer programs, computer compositions and compositional aids. Several machine code routines are included.

At the risk of plugging my own efforts, my book *Making Music on the BBC Computer* explains how to use the ENVELOPE command and includes sound effects, creating tunes, computer compositions and sound and animation synchronisation.

THE JOY OF AMPLE

Following on from the *Ample Auto Menu* program in the last column, I suggested that it would be interesting to develop the joystick routine further.

In case you haven't got around to it, this month's yellow pages contain a program which reads the values at the joystick port and converts them into pitch and pan information. This could be modified to control anything.

Any instrument can be used and it is particularly interesting to watch the 'performance' using the Mixing Desk option.

There are some interesting routines here which can be used in a range of programs.

Notice the mix and pad words which call the editors from within the program.

Some of the techniques could find particularly useful applications in programs for users with special needs.

If anyone writes or has written any useful programs in this field, please let me know.

Ian Waugh

NEWS IN BRIEF

● Panda Discs is compiling a second Children In Need disc. Sadly the closing date for contributions was the end of August, but it should be on sale by the time you read this, at £6 (inc p&p).

No doubt there will be a third volume so if you want to contribute start writing now to: Panda Discs, Four Seasons, Tinkers Lane, Brewood, Stafford ST19 9DE.

● Hybrid Technology has released a new program for primary schools and users with special needs. *Soundspace* lets you design, arrange and play sounds using a touchscreen or joystick. Coloured blocks are used to represent over 600 'sound shapes'. Up to 50 sounds may be combined into a two-dimensional 'soundspace' and stored on disc. Sounds are played using position and hand shape to control pitch, loudness and texture. Sounds can be replayed using a single ability switch. *Soundspace* is £33.35.

Contact: Hybrid Technology, 273 The Science Park, Cambridge CB4 4WE. Tel: (0223) 420360.

● If you want to record music on your computer, but you are not a keyboard player, there are alternatives. Harbour Town Distribution Services is now handling the Zeta range of MIDI violins, but they don't come cheap – the VC225 Violin Midi controller will set you back £1190.60. MIDI retrofits costing £330-399 are also available for traditional violins. Contact: Harbour Town Distribution Services, 71 Thornton Road, Manchester M14 7NU. Tel: 061-225 5647.

If you have any music news, tips or ideas, please write to: Ian Waugh, BBC Acorn User, *20-26 Brunswick Place, London N1 6DJ. Of particular interest are Archimedes music projects.*

PAUL JAMES and **GRAHAM BELL** look at the new top range Arc

FIVE'S ALIVE



At the *BBC Acorn User* show, Acorn unveiled its latest Archimedes, the A540 (exclusively announced in *BAU* last month). In essence, the machine is identical to the R260 Unix workstation, but comes without Unix and without the built-in Ethernet of the latter machine.

Externally, the new machine is similar to the existing 400-series Archimedes. The only exceptions are a slightly modified keyboard, with no function key strip holder, and extra connections on the rear of the machine.

Lift the casing and the innovations in the A540 become apparent. First, the power supply is a larger unit to give the extra power needed. Within the power supply are two thermostatically controlled fans and the unit occupies the whole of the left of the case.

The main board lies to the right of the case and the backplane sits in the conventional position, behind which is the podule area – a single podule is fitted as standard to provide the SCSI interface. In front of the backplane is a standard 720K floppy disc drive, identical to that fitted to 400-series machines, and beside this is the 100Mb hard disc. This is connected to the SCSI podule – up to six other SCSI devices can be connected externally. The internal drive is not a particularly fast model, having only a 25ms average access time.

The main circuit board is fitted with the minimum of 4Mb of Ram and most of the Risc chip set, but there is no processor. The Arm 3 is fitted to a small module that plugs in between backplane and floppy drive. There is also a row of three sockets for Ram expansion cards, each of which carries 4Mb of Ram and an extra Memc chip to control it.

This 'modular' design allows the A540 to be upgraded in future. Up to 16Mb of Ram can be plugged in, and the Arm 3 speed could also be boosted by adding Acorn's new Floating Point Accelerator (FPA) chip, due to be released in 1991 (there will be a socket for FPA on the Arm 3 module). It could also be replaced with an Arm 4 when this becomes available. The FPA will replace the current floating point podule, which cannot be used with any Arm 3 machine. Acorn says it will make FPA add-ons for existing Archimedes too.

The addition of an FPA will improve speed yet again – it should speed up floating point operations 40-fold over the current floating point emulator, to about 1.7 million floating point calculations per second.

The current Arm 3 runs at 30MHz, not quite as fast as the zippiest Arm 3 add-on boards. But the memory system of the new machine is boosted to 12MHz, half as fast again as existing machines, and this makes the A540 considerably faster than an upgraded A440. The VIDC video chip has been tweaked, so that it and the faster memory provide better display capabilities. New screen modes up to mode 32 are provided – super-VGA, 800 by 600 pixels with 256 colours and 60Hz refresh for a flicker-free display.

New VGA-only monitors for the PC market are cheaper than multisyncs, but some are unusable on 400-series machines because the VGA modes 25-28 are not quite the same as a PC (multisync monitors compensate automatically for the minor differences). The new A540 has an adjusted video system to provide true VGA and super-VGA, so VGA-only monitors are no problem. But what about non-VGA modes? Some software, particularly games and art packages, work only in one mode (usually 12 or 15), so a new software module allows the VGA modes to emulate the others. This results in a squat though usable display.

With other monitor types, normal multisync or high-resolution mono, the A540 acts exactly like the current 400-series.

The machine is supplied with the normal Risc OS, only slightly modified to take account of the possibility of up to 16Mb of memory. The welcome software, including *!Draw*, *!Paint* and *!Edit*, is already installed on the hard disc.

IMPRESSIONS

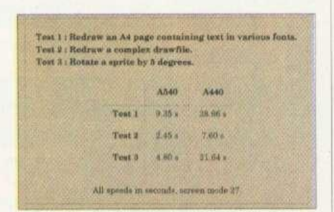
The new machine makes working with high resolution or 256-colour modes much more sensible. On the old 400-series, for example, using mode 28 hobbled the machine to less than one-third of its possible 4 MIPS performance (VIDC requires access to the Ram, and so prevents the Arm chip from executing instructions as fast as it could). But the increased memory speed, and the Arm 3's cache (which means it often doesn't need to access the memory to read the next instruction) reduce the contention for Ram – mode 28 still leaves most of the memory bandwidth available for the Arm.

So if you use a high-resolution screen mode, the improvement in speed could be nearer ten-fold, not the apparent three times improvement in raw MIPS. And the quality of the display at 800 by 600 pixels, with 256 colours on screen has to be seen to be believed.

DTP packages such as *Impression* can now provide a very smooth scroll. The hour glass very rarely appears, except when a new font is called for. It takes less than a second to rasterise a new font chunk rather than the three seconds the 400-series can take.

Aside from redrawing windows, another area of computing that requires huge amounts of power is image processing. Large sprites can be processed in a very short time, putting the A540 alongside more specialised equipment.

The A540 costs £3444 and is available now.



Test 1 : Redraw an A4 page containing text in various fonts.
Test 2 : Redraw a complex drawfile.
Test 3 : Rotate a sprite by 5 degrees.

	A540	A440
Test 1	9.35 s	28.86 s
Test 2	2.45 s	7.60 s
Test 3	4.80 s	21.64 s

All speeds in seconds, screen mode 27

LETTERS

Send letters to BAU, 20-26 Brunswick Place, London N1 6DJ



BALL INPUT

I am developing a system that makes use of the Arc. One restriction is that the keyboard will not be used. Instead, a trackerball will be placed in the arm of a chair and used to control the various dedicated programs. However if this trackerball could also be used to enter simple commands like *CAT, it would be very useful.

I wish to do this in much the same way as an arcade game gets a name for the high score table, where moving the ball up or down elects a letter, and pressing the Adjust button enters it. When I have finished, the Select button on the mouse should act like RETURN and the computer should process the command as if it were typed.

The final version of this system is to be used on a popular BBC television program – considerable accolade will go to the person offering the best routine.

John Walsh
Reading

What you need is a module that could interrupt the keyboard vector and take input from the trackerball instead.

It should read the trackerball position and status and transfer this into keystrokes. Send your routines to us and we will pass them on.

STRETCHING THE ARC

A quick word of thanks for the Archimedes *!Stretch* utility. I have not typed in and debugged a listing since the golden age of home computing in the mid '80s, and I had forgotten what fun-filled frustration it was.

I am a graphic designer and am already finding the program useful for special effects. With just a small collection of programs, notably *Impression*, *!Draw*, *FontEd*, *FontDraw* and now *!Stretch*, I can do everything (quickly and elegantly) that is possible on the slow, letter box screen-sized Macintoshes. I'm now using my Arc 310 more and more for serious DTP work.

K Simpson
London



The original snapshot...



The scanned image on screen

WRONGS RIGHTED

Re my review of the Irlam I-mage colour scanner: when published last month, the illustrations were wrongly captioned. This suggested the quality of the scanner was considerably worse than it is. The illustrations shown were in fact the original photograph and an Integrex printer dump of the scanned sprite.

Shown above are the original and the sprite on screen – considerable loss of quality occurs during printing.

Also I criticised the I-mage scanner for its inability to alter the contrast and colour saturation of the image.

This is now being cured: a new version of the *ChangeFSI* application that forms a part of the I-mage software will allow 'gamma-correction' of the scanned image.

Graham Bell
London

PIPE'DREAM'?

I am considering buying a computer system. As a teacher I would like to use data stored in the *Quest* database on our Nimbus network at school.

The science department has a mixture of BBC Bs and Masters that use *View* and *Viewsheet*. Is there a way of using the Master 128 in the way I want? Would the Archimedes with *Pipedream* be compatible with the BBC Master/Nimbus or do I need to look at a PC system?

Colin Andrews
Leicester

***Pipedream* for the Archimedes is compatible with the Masters and Beebs. It can take *View* or *Viewsheet* files and transfer them to *Pipedream* format – compatibility with the Masters and Beebs is no problem. It can also take Lotus 123 files from PCs. Transferring data from *Quest* shouldn't present problems.**

QUESTION UPDATE

I write regarding the letter in the September issue of *BAU* referring to the Casio SF8000 and the FA100 interface kit for use with the PC emulator.

The software is designed for use with PCATs, PS/2s and close compatibles. It also requires at least 512K of Ram, 256K of video Ram and no memory resident program to be loaded. For these reasons the FA100 will not work under the PC emulator.

Casio also markets an alternative package called *Datalink 200*. I have been able to test this on an Archimedes and can confirm that it works under the PC emulator. Configure the machine for 2400 baud, even parity and eight-word length.

A D Manton
Casio Electronics Ltd

OVATION REPLY

I must say that I am astounded by the letter from Simon Burrows (*BAU* October).

Simon wrote to us in July and said: 'I approve of you using software protection, to protect against piracy... so long as it never goes wrong, making the master copy unusable.'

Our reply to Simon stated that if customers find that their discs have been corrupted, we will always replace the discs.

It is debatable if a dongle or software protection is preferable. We have had positive responses from schools concerned about dongles 'getting lost'.

The installation of *Ovation* allows two extra working copies to be made. Simon unfortunately received one of a small batch with only one install.

If the user wishes to move the program from one machine to another, or change the directory in which it is installed, there is an un-install option keeping the two copies intact.

Adrian Calfcraft
Director,
Beebug Ltd

PRICE ERROR

I wish to apologise for an error in the advert for the Calligraph Arclaser in the October issue.

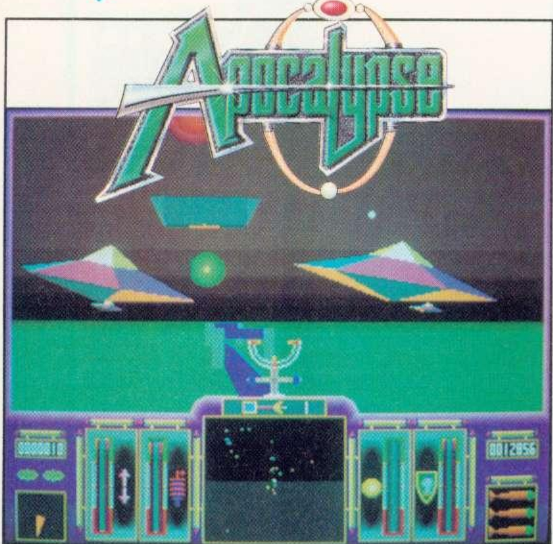
The Arclaser costs £899, not £799 as stated.

Duncan Pringle
BBC Acorn User





A3000 ARCHIMEDES BBC B/MASTER ELECTRON



APOCALYPSE

Apocalypse is designed purely for the Archimedes. Utilising the machine's colossal processing power combined with ingenious programming techniques, the author has created a masterpiece which could not have been produced on any other home computer. The author is of course Gordon Key who already has Holed Out and E-Type under his belt. Apocalypse is by far his best work to date.

The game places you on the surfaces of varied futuristic hostile planets colonised by ruthless enemies. With your highly advanced craft you must find your way around the planets and systematically annihilate the enemy. Your ship, which can fly or move along the ground, is extremely fast and can even fight whilst hurtling backwards.

The graphics are truly unbelievable. The solid, shaded 3 dimensional buildings and objects are animated more quickly and smoothly than ever before. If you shoot at them they explode in a way that is terrifyingly real often catching fire before bursting into a ball of flames accompanied by devastating sound effects.

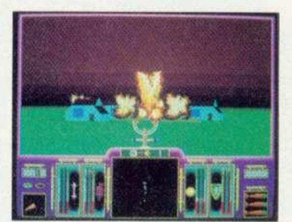
Initially Apocalypse is easy enough for a beginner to enjoy but as you progress your foes will become increasingly hostile and you will discover fascinating new objects. These can have strange properties and many may need to be destroyed. It will be up to you to discover how.

The Royal Guild of Spacing will monitor your progress as you play. Your performance will be assessed at appropriate times and you will need to impress them if you are to continue your adventure. Apocalypse is an amazing game. There's only one way to describe it....

RAW EXCITEMENT.

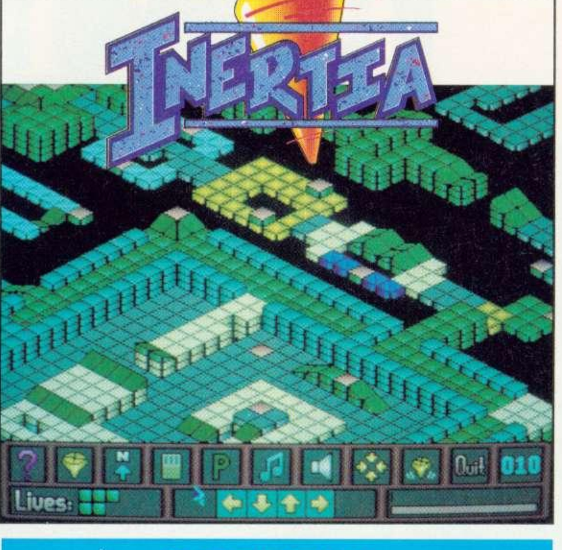
PRICE: A3000/Archimedes £29.95


A3000/ARCHIMEDES


A3000/ARCHIMEDES


A3000/ARCHIMEDES


A3000/ARCHIMEDES



INERTIA

Inertia is a totally original game with a huge landscape just waiting to be explored. It is available for the Archimedes, BBC Micro and Acorn Electron. Scattered (or rather fiendishly placed) around the landscape are many special tiles which need to be collected. Your highly sensitive craft floats freely around the landscape and you must exert forces upon it to guide its speed and direction.

You have a 3 dimensional viewpoint displaying a tiny fraction of the total playing area. There are walls, bridges, tunnels and ramps to negotiate and a host of mystery tiles with strange properties indeed. These include ice, jump and transformation tiles. There are even certain tiles which alternate the controls so that everything works in reverse.

This massive game has been very carefully put together and solving the puzzles within it will need lateral thought and a lot of dexterity.

The Archimedes version is considerably enhanced with digitised sound and music. It even features a full colour 3 dimensional map of the game which is a joy just to wander around. You'll certainly be amazed at the size of the game and the variety within it.

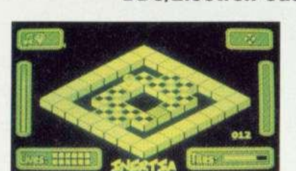
Inertia is a game for the determined. Each version makes full use of the ability of the computer so make sure you've got plenty of time to spare. Once you have started you won't be able to stop.

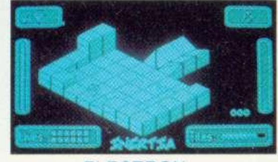
Electron User Golden Game May'90

*BBC Micro and Acorn Electron versions available **NOW**.*
Enhanced Archimedes version available in June, 1990.

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BBC B/MASTER


ELECTRON


A3000/ARCHIMEDES


A3000/ARCHIMEDES



MAN-A

In the age when the castle wa supreme it took dedicated warrior to overcome their defences, to loo and pillage, and finally to destroy

You are armed with a might sword cast from the remains of thunderbolt which fell from the sk many millennia ago. Also in you possession is a magic potion whic makes you invincible to all for sho periods of time. Armed with thes you must penetrate the inne recesses of 4 castles and do batt with all you find in them.

As you progress you will discove many intriguing objects which ca behave very strangely. Many ar documented such as woode panels, hour glasses, thorn portculli, mirrors etc.. But most ar

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A3000/ARCHIMEDES


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The subtle blend of arcade ...ming and adventurous puzzles make Man-At-Arms fiendishly addictive. You must plunder each of the 4 castles which become increasingly "puzzling" as you progress. Your overall objective is to kill all foes with your mighty sword and to plunder as much of the most valuable treasure as you can carry.

Man-At-Arms is a fascinating challenge with superb sound effects and music. No attention to detail has been spared and you can be sure of many late nights for weeks to come.

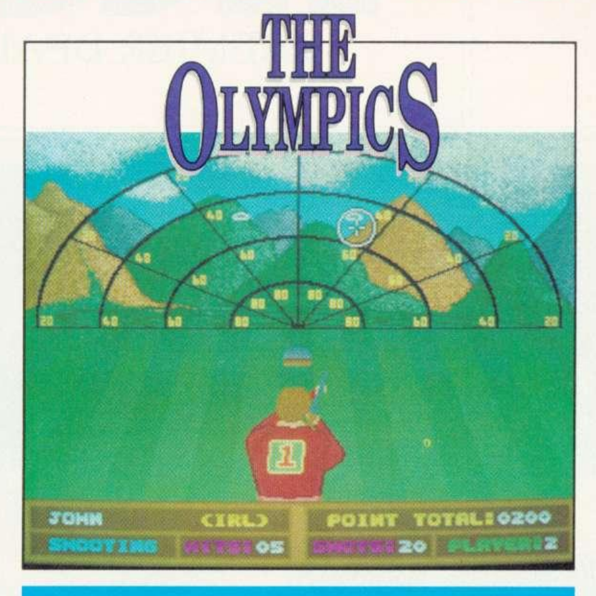
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A3000/ARCHIMEDES



A3000/ARCHIMEDES



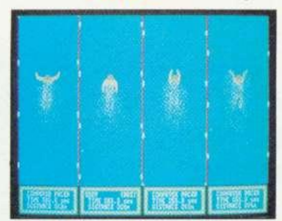
THE OLYMPICS

The Olympics is an experience which can be played by 1 to 8 players. It contains a superb piece of music, opening and closing ceremonies and 14 national anthems. When a player wins a gold medal the national anthem for his chosen country is played. Any World Records that you achieve can be saved to disc. With the click of a button all the relevant information concerning the record is automatically saved including your name, the exact time, day and date!

It is comprised of 6 main events: Diving, Shooting, Javelin, Swimming, Canoeing and Pole Vault. Some of these have several "sub-events" to choose from - there are 2 Shooting events, 12 Swimming events and 3 Canoeing events. These events have been chosen for maximum variety and enjoyment. They will "extract" all sorts of abilities: manual dexterity, timing, memory, perserverance, adaptability and above all guts!

The menu systems are controlled entirely with the mouse. As such they are extremely easy and quick to use. All events can be practiced or competed in individually, or altogether for maximum Gold, Silver and Bronze medals. You can also play all 6 events as a sort of "hex-athlon" where points are awarded for each event - the player with the greatest number of points is deemed to be the winner.

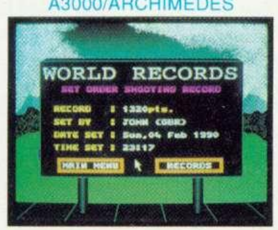
PRICE: A3000/Archimedes £19.95



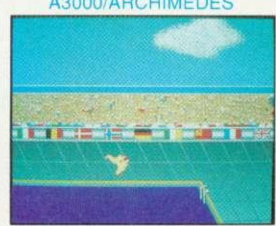
A3000/ARCHIMEDES



A3000/ARCHIMEDES



A3000/ARCHIMEDES



A3000/ARCHIMEDES



NEVRYON

This fast arcade game is disc based only and boasts 100K of graphics and game code for the BBC and 2 discs of over 1.5 megabytes for the Archimedes. It is a fast sideways scrolling shoot'em up which features 8 levels of furious opponents and very varied and very detailed graphics.

You fly a spaceship which can attain immense firepower - more lasers, a ram, gun droids and highly destructive missiles which are released from the top & bottom of your ship, then ignite and shoot forwards.

Whilst the BBC version is superb, the Archimedes version has been considerably enhanced and is truly exceptional putting many arcade games to shame. Nevryon uses the machine's raw power to full effect and gameplay is second to none.

It comes on 2 discs and features 5 true levels of parallax scrolling, more than 50 objects on screen, over 1 megabyte of 256 colour graphics, digitised stereo sound and music etc. etc.. You control a different ship on each of the 4 scenarios and there are a seemingly infinite number of weapons to collect and use. End of level monsters are beautifully animated but are anything but friendly.

BBC Review: "Graphics are very colourful and hectic, with explosions, missiles and aliens all heading for your ship. Together with a scrolling landscape, complete with stars moving in the background, they combine to form an enjoyable and action packed game." Micronet, Feb'90.

*BBC Micro version available **NOW**.*
Enhanced Archimedes version available in June, 1990.

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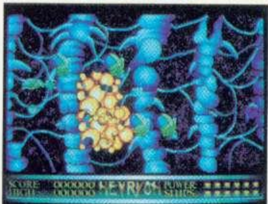
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BBC B/MASTER



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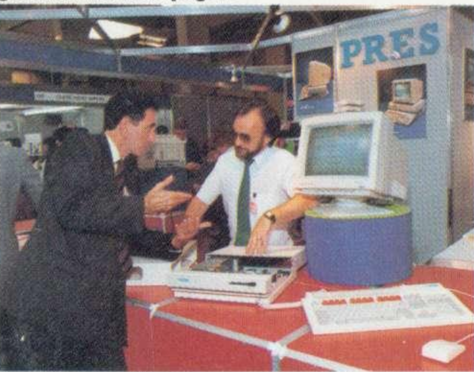
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Throngs of visitors 'cut a rug' at the show



'Let's be honest – this is the only way I'll ever get onto the front page...'



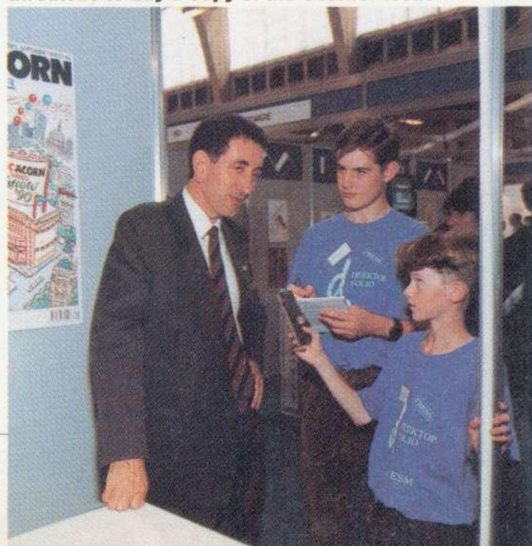
'So, Arm 4 really means putting all four fingers into the machine...'



The BAU team (and Fred) stand aghast as a potential reader threatens to buy a copy of the October issue



'Okay, so we've got a blank screen – but this is a music lecture!'



'Funny you should ask, but my favourite pose for radio interviews looks something like this...'



'Never mind Chopsticks lads, where's the hip-hop button...'



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 A selection of problems from our Post A Problem service



QUESTIONS AND ANSWERS

Q I am confused as to exactly what Ace Computing's *Euclid* will do. A colleague says it works like a 3D version of *!Draw*. Can you tell me more?

A *Euclid* is an object-orientated 3D graphic editor in the same way Acorn's *!Draw* is a 2D graphics editor for the Archimedes or BBC A3000.

3D objects can be created and stored separately and subsequently combined as required to create 'scenes'.

When objects have been combined in this way they can still be manipulated and modified separately if required.

Scenes can be displayed in different styles: wireframe – lit or unlit; multiple light sources are possible; you may have faces only or faces and edges, and monochrome or colour.

Q I am exploring the potential of the Archimedes for computer graphics work. I wish to superimpose the colour video output of my Archimedes A440 on to a signal from an external source like a video camera or video cassette recorder.

What kind of extra equipment do I need?

A You need to consider the purchase of a Video Genlock device and software to run it. A suitable one for your purposes would be the Chromalock podule card from G2 Systems. It costs about £300.

Q I have a BBC Master Compact and have found out it does not have a RS232 port like the BBC Master 128. Is it possible to fit one?

A Acorn, or one of its dealers' will supply you the necessary upgrade kit. It will cost about £30. The RS232 expansion consists of plugging in four ICs – IC5, IC9, IC13, and IC14.

Once these chips have been added to the Master Compact there is full RS232 specification.

Q I am having difficulties using my BBC Master 128 with the Brother HR-1 printer. I can't get it to print anything. Can you help?

A Normally Brother printers in the HR series which have been attached to the BBC Serial port have the BBC configured to 300 baud. It is the Brother EP44 printer that uses 1200 baud.

I suggest you configure the dip switches inside your printer so that it receives data from the Master at 300 baud.

As you have a HR1 you should use *FX5,2 to select serial output, and *FX8,3 to select 300 baud.

If 1200 baud is required you will have to use *FX8,4.

With the Master 128, this can be done by using the *CONFIGURE command so that it is permanent.

*CONFIGURE BAUD number will change the RS232 transmit receive rate setting according to number. *CONFIGURE PRINT 2 will change the printer type setting to Serial. You will need to press CTRL-BREAK after altering the configuration for them to work. Check by typing *STATUS.

Problems can occur with the orientation of the plug that connects the printer to the Master computer's RS232 port, because it can be fitted 'correctly' in a number of directions. However, the printer will only function with it fitted one way. Many RS232 plugs have a cut out piece which should be either at the top or the bottom when fitted. Do try it in at least these two ways!

Q I have a Master 128 and I'm interested to know whether it is possible to link this micro up to a Research Machines' Nimbus UX/2 and therefore access the Winchester hard disc which forms part of the Nimbus.

A You will certainly not be able to link your Master 128 to the Nimbus and use the BBC's operating system to access its Winchester. But you will be able to port (and run) BBC Basic and some 6502 assembler programs to the Nimbus. Research Machines markets a very good version of BBC Basic and the BBC emulator which will allow the Nimbus to run many of your BBC files without alteration.

Q I have just purchased a secondhand BBC model B which is unexpanded in memory terms. At present it has the Computer Concepts Mega Rom installed which gives me facilities for word-processing, spreadsheets and graphics for charts. I also want to use my 'new' computer for basic accounting.

A colleague has told me I may have to expand my computer's memory to do all these sorts of things.

A All versions of the BBC micro are relatively short of memory, particularly the model B. The memory of the machine can be increased, but not to the extent of the memory capacity of 16-bit machines like the Atari

If you have a problem with an Acorn micro, commercial software or a program you are trying to write then *BBC Acorn User* can help. The Post A Problem service guarantees to give you a personal answer within 10 working days for just £4.

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Please note that debugging readers' own programs or those from other magazines is a complex task and we cannot guarantee to give a full solution. Unless the problem can be spotted quickly, the Post A Problem service will only be able to make general comments. The service will answer the problem and return all material received within 10 working days of receipt. If we fail to match this promise then your cheque or postal order will be returned – you can't lose!

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ST, IBM PC or 32-bit machines like the BBC A3000.

One of the major problems with the original BBC micro was the way graphics and other screen functions 'grabbed' large chunks of the computer's memory – except mode 7 which took only 1K.

I note you are using *Interword*. As you may know this uses mode 0 to give it its Wysiwyg display which occupies 20K of memory, which leaves you with just 4K to store text. There are other programs like this, especially the powerful software which was released four or five years after the BBC first appeared.

Many users add shadow Ram which provides the 20K to cover the maximum screen memory. Look at the adverts in *BAU* for details of some of the expansion boards available, you should expect to pay about £60. Because shadow Ram is so useful it has been fitted as standard in the newer BBC micros – model B Plus, Master 128 and Master Compact.

Q I have a BBC model B with the sideways Rom sockets full. I want to expand my computer to hold more sideways Roms such as a spellchecker, a program toolkit, another computer language and hold Ram images too. What upgrade would you recommend?

A If you want to plug more sideways Roms into your BBC model B and read in sideways Ram images I recommend the Watford Electronics Ram/Rom Card, which is a highly sophisticated second generation sideways Ram/Rom expansion unit. It will give you plenty of additional Rom sockets and some banks of sideways Ram too. It costs £59.

Q When using the PC emulator on a BBC A3000 will the normal mouse supplied with the computer work?

A The A3000 mouse will operate under the emulator but you will need a copy of the Microsoft mouse driver. Unfortunately this was not provided by Acorn on its MS-Dos system disc supplied with the PC emulator. It is available on any Microsoft package that needs a mouse to operate. To use it you will have to add the following line to your CONFIG.SYS file:

```
device=mouse.sys
```

Q I have discovered that on my Archimedes when the RamFS is selected the *BYE command for parking the head of the Winchester hard disc does not work.

Rather than leaving the filing system is there a way of overcoming this?

A Try typing *ADFS:BYE. If you have a SCSI hard drive you should use *SCSI:BYE

Q I have just purchased a BBC A3000 Learning Curve package with *First Word Plus* included. I am very pleased with it but am having some problems with the Epson LQ 850 printer I previously used with my Master 128.

Everything is fine until I use the sheet feeder for printing documents longer than one page. Is the sheet feeder just not compatible?

A Unfortunately there is an acknowledged bug in *First Word Plus*. The solution is to edit out the 'vertical tab to line' entry in the LQ printer driver source. Acorn Customer Services has produced an application note to guide you.

Q I'm a regular user of the Acorn PC emulator on my 410, I have been grappling with Acorn's GETFILE and PUTFILE utilities for transferring material between MS-Dos and ADFS. I have heard there is an easier way. Help me before I grapple no more and give up!

A You need to get hold of *!PCDir*, which is a public domain package written by Keith Sloane. It allows MS-Dos format discs to be written to, and read from, the desktop. You can get a copy on a Shareware disc from Norwich Computer Services.

ACORN CUSTOMER HOTLINE

Here is a tip for *First Word Plus* and Epson compatible printer users. Although it has been mentioned in this column before I feel it is worth mentioning again as this package is now supplied as standard with all BBC A3000 Learning Curve Systems. *First Word Plus* requires the printer to have auto-line feeds disabled, but as this clashes with other Archimedes packages we have devised changes to the printer drivers to resolve the problem.

```
Entry 1 set to D Entry 23
set to 1B, 41, 0, D, 1B, 32
```

● Many education establishments and businesses often need to link their existing networked Archimedes computers to other standard networks such as Ethernet. Now with the introduction of the TCP/IP Protocol Suite it is possible to link other TCP/IP based systems to your network whether they are mainframes, minis or PCs.

Many Archimedes computer users are familiar with networking through Econet – the low-cost networking system from Acorn. By using an Acorn workstation, fitted with both Econet and Ethernet interfaces to act as a gateway, it is possible for Archimedes computers to communicate on both networks. A gateway can be set up using either a Unix workstation, such as an R140 or R260, or an Archimedes computer such as the 440/1. Thus, existing Econet users can link up with, or add, Ethernet networks with Unix machines, and existing Ethernet users can add low-cost Econet networks to their installations.

TCP/IP services include:

✻ An NFS client service letting users examine files and directories on network computers from the Risc OS desktop.

✻ A VT220 terminal emulation which allows the user to view information held on a number of remote Unix systems.

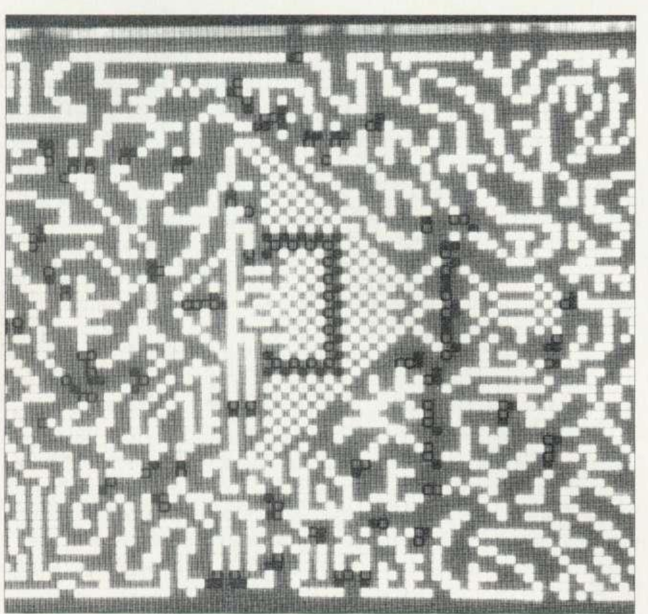
✻ Electronic mail facilities via a Unix server to the international Unix mail network. This is provided via the *!MailMan* application which is supplied with TCP/IP.

● A number of people have requested that we supply information on how the Support Information Database (SID) can be accessed. If you would like to have a look at what SID offers, try the guest system on (0223) 243642. You will need a modem, viewdata terminal software set to 1200 baud receive, 75 baud transmit, seven data bits and even parity. This lets you see much of the system without being a registered user. Information on becoming a registered user can be obtained when on-line.

● Acorn has released a new Rom for Acorn I/O Podule users. If you have an I/O Podule with a Serial Number before 'AKA10 1002682' then you should contact your Acorn Dealer requesting that they supply and fit the new Rom under 'FCO 2011'. Please supply both the Host and Unit serial numbers to the dealer who will require them to complete the service report. The dealer will not charge for the upgrade.

● Third party software, particularly games, reconfigure the BBC A3000 and Acorn Archimedes systems to gain the maximum amount of memory, for instance by unplugging parts of the operating system, before running. This can, however, cause problems once you have finished using the software if it has not configured the computer back to how it was before the software was run. The problems you can experience are messages like 'SWI &xxxxx Unknown' which normally means that one of the operating system modules that normally provides this call has been unplugged. To find out which modules have been unplugged type *UNPLUG. This will list the modules which can be reinstated using the command *RMREINIT <modulename> eg. *RMREINIT FontManager.

WORLD WIRED



We've just got over the excitement of our 100th birthday celebrations. But no rest for the wicked – it will soon be time to start the Christmas revelry.

The December issue will have you electrified with its wire generating program. You will be able to draw simulation circuits and send electrons shooting around the wires.

There's a round-up of the best games of 1990 – an essential read before you start demanding your Christmas pressies.

And you have no excuses for not sending all your Christmas cards. We've got an extensive address book for your Arc, and we also explain the technique of writing such a program.

Plus we go behind the scenes at Clares to find out how *Interdictor 2* was developed.

A for Arty, B for Bezier – for graphics fans we've got the definitive graphics jargon-buster.

We look at how you can go about connecting your Arc or A3000 to some of the many interfaces available.

Picpac – your own graphics package for your Electron – is developed further, and our look at IT in the National Curriculum continues with a focus on Maths.

With all this and the regular news, reviews, hints and tips, the December issue of *BBC Acorn User* is essential reading for the discerning Acorn user.

ORDER YOUR COPY NOW – ON SALE NOVEMBER 8TH

SILICON VISION

DESKTOP SOLUTIONS FOR THE ARCHIMEDES & BBC A3000

SolidTOOLS



The fully integrated environment for 3D CAD, Animation, Rendering & Hardcopy. The package includes SolidCAD, FILM-Maker, SolidsRENDER, Realtime Graphics Language, SuperDump & SuperPlot for a turnkey solution satisfying all your 3D Design and Presentation requirements.
(RISC OS) New

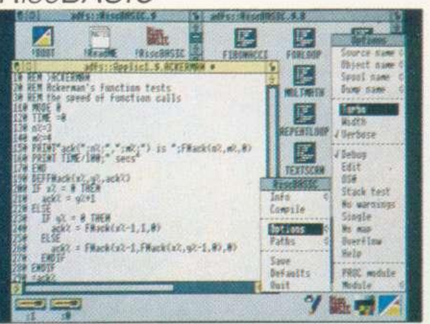
SolidCAD

The next generation multi-tasking CAD package combining 2D Draughting and 3D Modelling techniques with advanced smooth shading and lighting effects to provide the ultimate 3D Draughting System for Architectural design, Interior design, Engineering design and Teaching CDT. Allows drawing in plan, front & side elevations and also directly in 3D to visualise a model while it is being created. Powerful zoom, pan, sweep, extrude and macro facilities are also provided to enhance design productivity.
(RISC OS) New

SolidsRENDER

The most advanced Ray Tracing package for the Archimedes producing photo-realistic images of SolidCAD designs or FILM-Maker animations taking into account multiple light sources, reflections, shadows, transparencies, refractions and textures for the highest quality pictures from the leading 3D graphics experts renowned for technical excellence. The high-speed ray tracer uses sophisticated colour mixing techniques to provide the maximum range of colour shades plus anti-aliasing for smooth edges, motion blur effects, dynamic viewpoint, variable camera lens for wide angle and telephoto effects and multi-colour light sources driving the Archimedes display hardware to its limits for the best photo-realistic images within the laws of optical physics.
(RISC OS) New

RiscBASIC



The best BASIC V compiler money can buy. Here's what the reviewers say:
"If you are looking for THE compiler to go for, and are confused about which one deserves to win the very public battle that has been raging in the advertisements, well my preference is for RiscBASIC"
- RISC USER August 1989.
"In summary, BASIC V is the best version of BASIC produced and RiscBASIC provides the most compatible, fastest compiler for this language. This will be an invaluable addition to every serious BASIC programmer's toolkit. My congratulations to Silicon Vision" - Archive June 1989.
"very useful indeed for development work...produced significantly more efficient code" - Micro User July 1989.
"RiscBASIC wins the race...has the edge overall...more likely to provide the correct results" - BBC Acorn User Nov 1989.
"Still the only true BASIC V syntax compiler. If you want the best, buy Silicon Vision's complete answer"
- Micronet August 1989.
(RISC OS) New

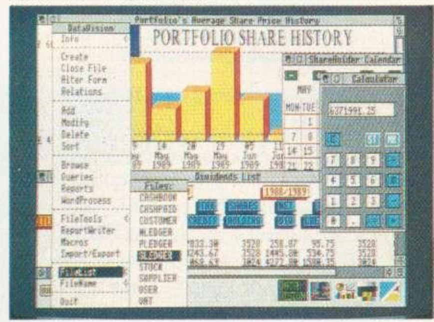
GerberPlot

The complete Gerber driver for ARC-PCB and ARC-PCB Professional Printed Circuit Board design packages producing Gerber plotfiles for driving Electro-static Photo-plotters. These plotfiles may be sent directly to photoplotter bureaus on Archimedes ADFS or MSDOS disc formats to produce the highest quality PCB artwork for professional results.
(RISC OS) New

SuperPlot

The complete plotter driver for SolidCAD, Realtime Solids Modeller and Gate-Array Design System supporting the industry standard HP-GL, Graphtec, Watanabe and Plotmate plotters.
(RISC OS) New

ShareHolder



The complete share holder's management system providing all the facilities needed to automate your portfolio. Features include Company statistics, Share holdings, Transaction processing, Portfolio history, Forecasts, Dividends due, Share price updates plus built-in Calendar, Calculator and Hardcopy facilities for total integration.
(RISC OS) New

DataVision

A full featured true relational database management system which also includes word processing, label printing, reporting, & mail-merging facilities in one integrated environment for the Archimedes, bringing professional quality business software to the demanding user. The database manager is rich in features and includes facilities for the production of complex queries, detailed reports, browsing, sophisticated relational data entry, relational reporting, interactive & global editing, formula entry and validation. All this in an intuitive easy to use mouse driven environment.
(RISC OS) New

Financial Accountant

The professional business accounting and database package which includes DataVision together with turnkey applications for Order Processing, Invoicing, Sales ledger, Purchase ledger, Nominal ledger, Cash book, Stock management, Reporting and VAT analysis complete in one integrated environment.
(RISC OS) New

OfficeTools

The complete Office Automation system for Database management, Mail merging, Wordprocessing, Label printing, Order Processing, Invoicing, Accounting, Share portfolio, Forecasting, Dividends processing, Calendar, Calculator and Presentation graphics. Includes Financial Accountant, DataVision, ShareHolder, and the Presentation System providing a turnkey solution for all your business and management requirements.
(RISC OS) New

All software run in native mode on A300-400 Series & A3000 with RISC OS. Enquire for our free product Catalogue

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For all Archimedes and A3000 owners, **DAVE ACTON** has compiled hi

RISC REVUE

£15 BOUNCING BAUBLES

Here's a nice little bit of animation to start this month's proceedings. It comes from **Barry Wickett** of Walsall and takes the shape of listings 1 and 2 on the yellow pages.

Listing 1 builds up a set of sprites representing stages in the animation of a bouncing ball. The sprites are saved as 'Balls'. Listing 2 loads this file and performs the animation.

The text that gets wrapped around the ball is contained in the string text$. This is displayed and the array c%() is then built up by reading the colours of points from the screen. This array is used to place the text on the ball in the correct place. The two-tone effect is achieved using GCOL 2,14 followed by a PLOT 85 command. This ANDs a triangle with the text, so that half of the text is in colour 15 and the other in colour 14.

Next the ball is plotted and 'grabbed' from the screen as a sprite called 'ball'.

Note that the system sprite area could have been used, but in general this is not a good idea because it can't guarantee that a machine has enough sprite memory set aside.

If not, *CONFIGURE SpriteSize must be used to correct this. Instead, a user sprite area can be used and in the program this is called sp%.

This is simply DIMmed to the correct size and the first four words are set to the size, 0, 16 and 16 respectively.

Thereafter, SYS "OS_SpriteOp" can be used to perform all the relevant sprite functions. The ball is grabbed using SYS "OS_SpriteOp",16+256. This is the equivalent of two MOVE commands and a *SGET.

The frames are plotted one by one and grabbed using SYS "OS_SpriteOp",16+256 again. The blank ball is replotted with SYS "OS_SpriteOp",34+256 which is similar to a *SCHOOSE followed by PLOT &ED.

Finally, the blank ball sprite is deleted and the sprite file is saved – both using "OS_SpriteOp" calls.



Playback is straightforward enough. Listing 2 uses two mode 12 screens for smooth animation, so ensure you have at least 160K of screen memory configured.

You might like to experiment with the listings by changing some of the values used. g% in listing 2 is gravity – try a value of -1.

The e variable represents how much of the ball's energy is retained after hitting the ground. maxframes% and rad% are the number of frames and radius of ball respectively.

Make sure you use the same values in both listings and increase the size of the sprite area sp% if necessary.

£10 AIDE MEMOIRE

My sieve-like brain will no doubt benefit from this little utility from **David Murphy**. It's an anniversary reminder – just add important dates to the end of the listing then, whenever run, it will tell which birthdays, etc, are coming up (and which ones you've just missed).

Listing 3 is the program. Each anniversary is made up of the following data: date, month, year (if known, ?? otherwise), type of anniversary, name, details. If a year is supplied, the number of years since the starting year will be displayed with the other details, so particularly special dates can be spotted. The last field can contain whatever you like. Ensure the final DATA statement remains in place to mark the end of the list.

Congratulations! You're 100 issues old this month!!

David suggests including the program in a !Boot file so it is run regularly. His !Boot file contains the following line:

```
*DESKTOP RUN "Annie"
```

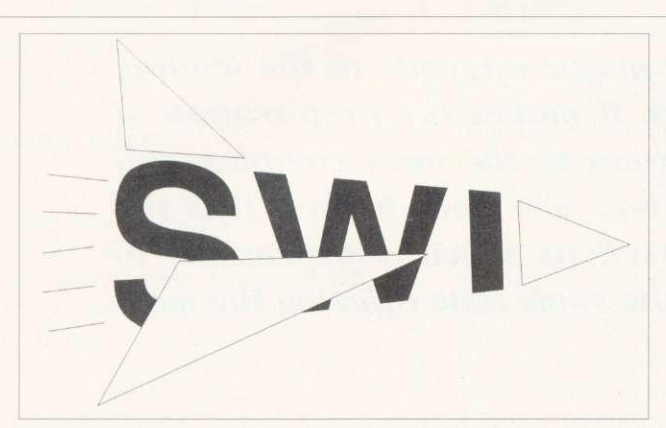
The program works by calculating for each anniversary a day-number (ie, an integer that is the number of days from some arbitrarily chosen starting point). The difference between this and the day-number of today is found and if the absolute value of this is less than eight the details are printed. So anniversaries up to a week ahead (and past) are displayed.

TOKEN GESTURE

The SYS call OS_PrettyPrint has been around for quite a while. It performs in a similar fashion to OS_Write0, displaying a null-terminated string on the screen. However, special characters are recognised by OS_PrettyPrint which make it a much more versatile call.

Tabs (Ascii 9) are expanded by OS_PrettyPrint and the cursor will move to the next multiple of eight columns if a tab is encountered. Hard spaces (Ascii 31) are also recognised. These are necessary because the call splits text at the end of a line if a word will not fit. Hard spaces overrule this feature.

The most sophisticated feature of OS_PrettyPrint is the ability to use tokens to refer to words from a dictionary. This is employed by the OS to reduce the space taken up by text messages. OS_PrettyPrint takes three parameters. R0 points to the string to be printed, R1 to a dictionary (0 meaning the Risc OS dictionary) and R2 to a 'special string'. Tokens can be included in the string as ESC (Ascii 27) followed by the token number. A token



number of 0 refers to the special string pointed to by R2. Token numbers of 1 or more will be expanded to the appropriate entry in the dictionary. Listing 7 demonstrates the call and shows the tokenised words from the Risc OS dictionary.

FASTER SWIs

A nice feature of Basic V is that it allows SYS calls to be made by name as well as by number. This leads to much more meaningful listings – SYS "Font_Paint" is considerably more readable than SYS &40086. However, the price to be paid for this readability is speed.

The SWI name has to be decoded and the number found each time the call is made. Surprisingly, the time taken to decode the name can be a lot longer than the time for the call itself in many cases. If time is critical then, numbers may be best after all.

Some SWI numbers are easily memorable and can be used without making a listing unreadable. For example, SYS &6 is generally recognised as OS_Byte. Others are not so familiar, so you might decode the name at the start of your program and store the number in a variable. This is done using the call SYS "OS_SWINumberFromString" (&39 in fact!) which takes a pointer to a string in R1 and returns the SWI number (if known) in R0. So, your program might have this line at the start:

```
SYS &39,,"OS_Word" TO osw%
```

and subsequent OS_Word calls could be made with SYS osw%.

Listing 5 on the yellow pages uses this call to scan through a Basic program and change all SWI names to numbers. Simply run the program, enter the name of your Basic program and the name of the new version. The program looks for the token &C8 followed by &99 which is SYS. Then, if a string is found after this, it is converted to a number using SYS &39 and this is written back out in hex.

The program reads in a line of Basic at a time and the length byte of each line is adjusted accordingly if a SYS name has been replaced.

Listing 6 is a short demo. Before applying listing 5 the test takes 3.35 seconds to run on my old machine. After using listing 5, the time goes down to just 1.6 seconds!

£5 !MAESTRO TIP

Derek Dawson of Inverurie has supplied a fix for the Risc OS music editor, *!Maestro*. If you have more than 20 voices loaded in your machine, *!Maestro*. can't cope and crashes. However, two simple adjustments allow up to 32 voices to be present (the maximum number that Risc OS permits). The alterations should be made to !RunImage in the *!Maestro* directory and the lines to change are 30810 and 30820. In both cases the number 20 should be replaced with 32.

This fix applies to versions 1.64 and 1.65 of *!Maestro* (and possibly others, if they exist). Remember to save a copy of the original just in case.

£10 SIDE EFFECT

I'm not too sure of the practical implications of this next program – I'm sure someone will find it useful though. It's a little Basic program to rotate the way text is displayed through 90 degrees. It comes from **P Drinkwater** who achieves this result with a VDU command and a few simple FOR...NEXT loops. You'll find the program as listing 4 on the yellow pages.

The VDU 23,16,12 at the start instructs the OS to move the cursor up and across when printing instead of across and down. The VDU 23,16,x,y command can be used to produce a variety of effects by setting or clearing bits in a status byte used by the OS. The current setting of the flags is EORed with x and ANDed with y. Thus, setting y to zero (as in listing 4) will cause the flags to be set to the value of x. Try VDU 23,16,41 for another interesting effect. A full list of the meanings of each bit of the status byte is given in table 1.

Having altered the direction of cursor movement, the character set has to be rotated. This is simply a bit-shuffling exercise. The existing character definitions are read using an OS_Word call and, after rotating the bits, VDU 23 is used to redefine each character.

Bit	Effect if set
6	Ignore cursor movement beyond edge of window in VDU 5 mode
5	Cursor does not move after printing a character
4	If cursor moves off window in Y direction, move it to opposite edge
3	X direction is Vertical, Y direction is Horizontal
2	Positive vertical direction is Up
1	Positive horizontal position is Left
0	Enable 'scroll protect' (prevents premature scrolling)

Table 1. VDU 23,16 parameters

DO YOUR BIT...

All programs, ideas, hints and tips to: Risc Revue, *BBC Acorn User*, Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ. This column depends on your brilliant submissions, so don't hide your bushels under the carpet...

```
>L.
   10REM >Sideways (RR4)
   20REM by P Drinkwater
   30REM for Archimedes only
   40REM (c) BAU November 1990
   50:
   60MODE 1
   70VDU 23,16,12|
   80DIM defn 9,mat1(8,8),mat2(8
,8)
   90FOR ch=32 TO 127
  100  mat1()=0
  110  mat2()=0
  120  ?defn=ch
  130  SYS "OS_Word",10,defn
  140  FOR c=1 TO 8
  150   PROCbinarycon(defn?c,c)
  160  NEXT
  170  FOR x=1 TO 8
  180   FOR y=1 TO 8
  190    mat2(x,y)=mat1(9-y,9-x)
  200   NEXT
  210  NEXT
  220  VDU 23,ch
  230  FOR x=1 TO 8
  240   PROCconvtodec(x)
  250  NEXT
  260NEXT
  270END
  280:
  290DEF PROCbinarycon(val,r)
  300IF val>=128 THEN val-=128:m
at1(1,r)=1
  310IF val>=64 THEN val-=64:mat
1(2,r)=1
  320IF val>=32 THEN val-=32:mat
1(3,r)=1
  330IF val>=16 THEN val-=16:mat
1(4,r)=1
  340IF val>=8 THEN val-=8:mat1(
5,r)=1
  350IF val>=4 THEN val-=4:mat1(
6,r)=1
  360IF val>=2 THEN val-=2:mat1(
7,r)=1
  370IF val>=1 THEN val-=1:mat1(
8,r)=1
  380ENDPROC
  390:
  400DEF PROCconvtodec(x)
  410LOCAL c,v
  420v=0
  430FOR c=1 TO 8
  440  v+=mat2(c,x)*2^(c-1)
  450NEXT
  460VDU v
  470ENDPROC
>
```

Someone will be glad of the side effects of listing 4

IMPRESSION II

Impression release 2 is the first major upgrade to the leading DTP package for the Archimedes. It makes the preparation of documents, from the simplest letters to the most complex and intricate designs, easier than it has ever been before. It is the only program designed to be used as a word processor, to handle long documents while at the same time offering the most powerful page layout facilities.

Where word processing and DTP meet

As word processors grow more powerful year by year, Desk-Top-Publishing programs are becoming more like word processors, so that both types of product are evolving in the same direction. However few computers have either the power or a flexible enough operating system to allow the successful integration of the two approaches.

Impression on the Archimedes has successfully combined the best features of word processors and desk-top-publishing programs to create the logical result of that evolution. A word processor that can handle the most complex DTP, and a DTP program that can process words like no other - we call it a document processor.

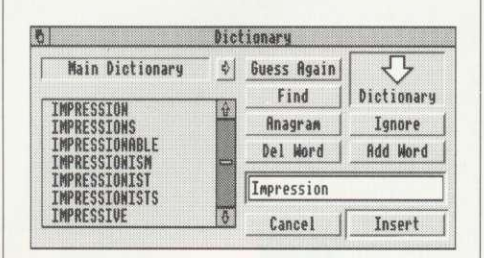
When other computers catch up with the Archimedes, all word processors will be like Impression. Why buy two programs when Impression can handle all your documentation requirements ?

Word processing

To be a successful word processor, a program has to be easy to use, include, amongst other things, real time spell checking, a powerful set of editing tools and the ability to handle documents from the simplest letter to complete books. What's more it has to be fast and responsive in use, something that lets down nearly all DTP programs.

Spelling checker

Spelling checkers have become a necessary tool in reducing errors in documents, not necessarily because they can catch spelling mistakes, but because they can also spot typing errors. The spelling checker supplied with Impression is based on the successful SpellMaster product, enhanced and fully integrated into Impression. It offers check-as-you-type, a 60,000 word main dictionary, up to 8 user extension dictionaries (which can automatically save themselves to disc) and two intelligent guess modes to help identify the correct word (one lists words that sound like the misspelt word, the other lists words based on the most common typing errors). It will even solve crossword and anagram puzzles.



The spelling checker dialogue

Long documents

Impression supports many features to aid the creation of long documents. By employing automatic disc slaving, it can handle documents of practically any size, even on 1Mbyte Archimedes. In fact, the memory available in the machine is no longer the limiting factor. Impression has already been used to produce books and manuals consisting of hundreds of pages, sometimes many megabytes long.

It also supports automatic index and contents compilation, again an enormous time saver. Impression 2 also has the ability to keep headings attached to the following paragraph, so eliminating 'widow' lines at the bottom of pages or columns. This improves the appearance of all documents, short or long.
As you might expect, automatic page and chapter numbering is supported along with the most flexible header and footer system around. These may be any number of lines at any position on the page, and even incorporate graphics. A new feature in Impression 2 allows headers and footers, or any frame, to repeat over a whole document or any specific range of pages.

Styles

Impression's unique style system can be a time saver for all types of word processing and DTP use. The appearance of headings, titles, quotes or any region of text can be made to appear in any combination of a vast range of stylistic effects. Each combination of effects can be given a name and applied to any required region of text with one key press. Styles save time because the combination of effects can be applied in one go rather than individually applying each effect, each time it is required.
Styles are retro-active - any edit or alteration performed to a style will affect all occurrences of that style in the text. For example, if all quotes in a document are set to be italicised, and you want to change them to be bold, this involves just a single style edit.

The Impression style system is unique in two ways; firstly in the number of options available - text can be any size (even as large as the page), any line spacing, any font, any colour (background or foreground). Text may be set to have a strikethrough line or be single or double underlined. Tabs can be leadered (it automatically puts dots between tabs). Paragraphs can have an

automatic ruling line placed after them (of any thickness and colour) etc etc.

Secondly, Impression styles can be applied to any region of text, from a single character to an entire document. They can also overlap, so that one style can be used in a paragraph while another is used for a few words in that paragraph. The above quote example is not possible on other DTP systems since they cannot apply a style to anything less than a paragraph.

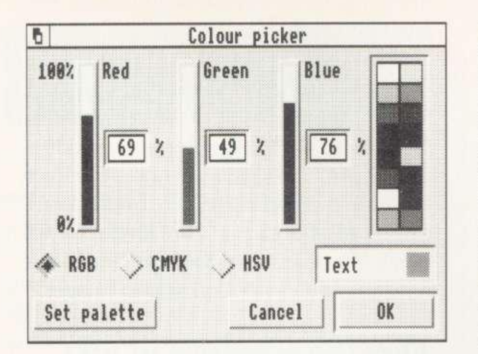
Master pages

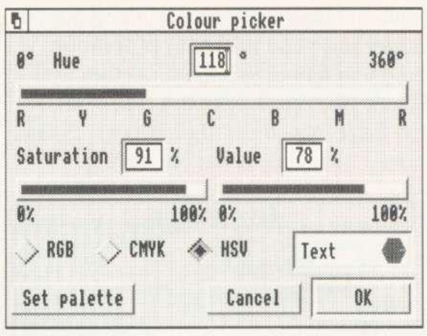
Impression master pages are a powerful tool that provides control over the appearance of a whole document. Master pages control the size, layout and structure of all pages in a document. If you want all pages to be based on three columns on A4 paper with a graphic in the corner, then the master page can be set to create all pages in this fashion automatically. However, master pages are really powerful because, like styles, they are retro-active. Any change made to a master page will be reflected throughout a document. So, if you decide to have two columns rather than three, or perhaps arrange the page landscape rather than portrait, this can be achieved by one master page change.

Impression supports any number of master pages (the pages can be any size) and can allow the page size to be changed *after* the document has been created.

Desk Top Publishing

All text and graphics are contained within rectangular frames. When using Impression as a word processor, these frames are created automatically on each new page, as the text flows from page to page. For desk-top-publishing work, the ability to place any frame at any position on the page gives absolute and total freedom of page design. Impression supports those features found in all good





The RGB colour selector (left) has a pre-selection of 16 colours, but allows any colour to be defined. Three alternative colour models are available, such as HSV shown on the right, which allows new colours to be selected in a more intuitive manner. These colour selectors can be used to set the colour of just about anything in Impression - text background and foreground, line and frame colours etc.

DTP programs such as the use of any font, any size. Frames of any size may be placed at any position on the page, and may be set to be transparent or opaque (any colour). By using the Acorn anti-aliased font system, it presents the ultimate in WYSIWYG displays. And since the scale of the page can be altered from 1% to 900% of actual size, it is possible to examine the page in enormous detail so that text of 1pt can be edited, or at smaller scales, complete page spreads can be viewed. Impression even allows more than one window, at different scales, on any document.

Impression also includes two essentials needed for any high quality, professional publishing, hyphenation and text grid-lock. The latter ensures that lines of text align across columns. Examine most quality newspapers or magazines and you will see that, even when pictures or different size headings are used, the main body text remains aligned across columns.

Hyphenation is of course used in virtually all printed material. This advert, magazines, books and all newspapers use hyphenation to improve the look and readability of text, especially when arranged in columns. Impression will hyphenate automatically if required, using a combination of exception dictionary and algorithmic hyphenation.

Users can add their own hyphenation points either manually in the text (using soft hyphens) or to words in the hyphenation exception dictionary.

Frames

Since frames are a key part of Impression, a great deal of time has been spent ensuring that all possible frame manipulation tools are provided in a fashion that is convenient and simple to understand. Text frames can be connected to other text frames so that text will flow from frame to frame, in any desired order. (This can be displayed graphically, along with the number of words not fitting within a frame.) Any frame can be re-sized at will, and each frame can have independent repel margins. (Text can be made to repel around another frame, and the repel distance from any side of the frame can be controlled.) Text contained within a frame can also be inset from the frame edge by any amount.

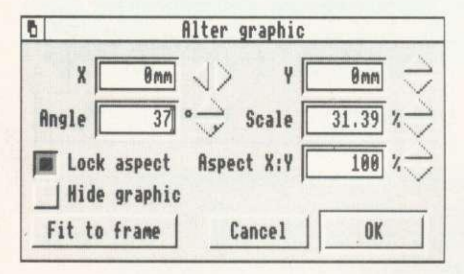
Multiple frame operations

Any set of frames on a page can be temporarily selected together (multiple frame selection). In this mode the frames can be moved together as a group, and they can be copied to other pages or other documents. If one is re-sized, all others will change size by the same amount. (Imagine you want to make three columns slightly narrower - by selecting all three columns and changing the width of one, they will all change by the same amount.)

In addition frames can be permanently grouped, so captions can be permanently

Charles Dickens.
This image was scanned using the Scan-Light Junior scanner at 400 dpi. This sprite was re-touched using !Paint and a mask drawn around the head. Although Impression cannot automatically flow around irregular shapes, by placing a collection of transparent, but repelling, frames around the drawing, the text can be made to repel around any desired shape. By using the group frame facility, the repelling frames can be permanently tied to the drawing, so that the whole image with its repelling frames can be moved and scaled as one.

attached to graphics. This also allows multi-column text frames. Since grouped frames scale and re-size in proportion, three text frames grouped together act exactly like one single, three-column, text frame which can then be cut, copied, moved, dragged etc. as one object.



The Alter graphic dialogue allows precise numeric values to be entered.

Graphics

Either line art graphics (for example from !Draw) or bit-image graphics such as sprites, scanned or digitised images, can be placed in a frame. The graphics can be scaled, stretched, cropped as required, all instantaneously. Graphics can also be rotated by any angle, also instantaneously. And it can do all this without going near a dialogue box or menu option. Of course you can enter exact numeric scale or rotate values if required.

All graphics scale and rotate options are performed in real time - there is no delay or calculation required, and neither is the original graphic altered. So graphics can be scaled and rotated as much as you like without suffering cumulative distortion effects. Neither could it be simpler - by using the adjust mouse button, any graphic can be dragged around the centre of the frame, interactively. Speed tests indicate that rotation of sprite graphics is over 500 times faster than !Paint.

Although Impression cannot directly rotate text, it is supplied with a utility program that will convert lines of text into an outline graphic file. This can be dropped onto a frame where it can be freely rotated; ideal for headlines or any text that needs to stand out.

Grey level dithering is another unique feature of Impression. Normally a maximum of 16 shades of grey are reproducible on Archimedes monitors. However, by using a dithering ability, Impression can represent over 60 grey levels, for all types of graphic - sprites and Draw files, resulting in far more on screen images.

Flowing graphics in text

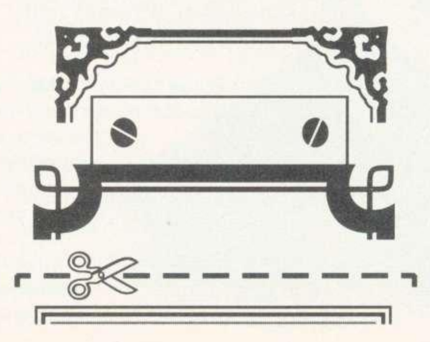
$$x_i = \sum_{k=1}^{n} t_i + m + \frac{A - Bc}{c + d} - y$$

Any document more than a few pages long, that contains graphics, usually requires the graphics to be tied to a particular part of the text. Impression can embed any graphic into the text, even as part of a line if required. For example, the above equation (from our Equasor program) embedded into the text will stay with this text wherever it is moved.

Graphics !
Graphics !
Graphics !
Rotation !

Borders

Frames can be highlighted with one of the ten built-in border types. Each frame can set any border type for each of the sides of a frame individually. Impression 2 now has the ability to import Draw files as additional border designs. And, of course, Draw files will always render to the maximum resolution of the printer - i.e. no jaggies.



Printing

Impression has always had a very wide range of printing options. Impression 2 takes this even further by supporting two completely different modes of operation - draft printing and RISC OS printing.

Word processors typically use the built in character set of the printer - this is fast and ideal for text only documents. DTP programs, on the other hand, use the RISC OS printer drivers that can deliver an exact representation of the page, including all fonts and graphics, to the maximum resolution of the printer. Unfortunately RISC OS printing can typically take 5 or more minutes per page on most dot-matrix printers. (PostScript or direct drive laser printers are the exception to this rule.)

Impression 2 supports both modes. Draft mode allows any document to be printed using the built-in character set of the printer, matching the closest fonts available in the printer to those used on screen. This can be used for obtaining a quick text draft of any document - even complex DTP layouts. If Impression is being used as a text only word processor, this mode is fast and accurate while still allowing full control over printer attributes such as bold, italic, underlining etc. This mode even allows multi-column text, multi-line headers and footers etc and so means that Impression is now a truly effective alternative to traditional character mode word processors such as First Word Plus.

RISC OS printing in Impression allows the page to be scaled by any amount or rotated by 90 degrees. Unique features are its pamphlet mode and multiple pages per sheet options. This allows any number of scaled down pages to be printed on a single sheet - useful for thumbnail printing and vital for proofing since it means that A4 documents can be printed 2 up, as A5 pages on a single sheet of paper. The pamphlet mode takes this further by printing the pages correctly rotated and arranged for folding into a pamphlet.

Impression 2 also allows any number of copies of a page to be fitted on each sheet and reflected printing (professional typeset pages can be printed emulsion side down.)

Some examples of some of the frame borders possible from Impression. You can also design your own with !Draw.

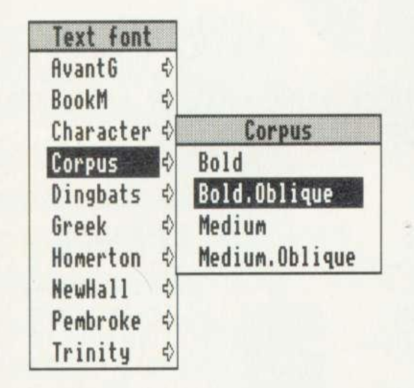
Needless to say, this document was created, arranged, edited and typeset entirely with Impression 2 on a 2Mbyte Archimedes. Line-art originated from

Word substitution

Another unique Impression feature is word substitution or abbreviation expansion - as you type. Any commonly used word or phrase can be assigned any abbreviation and added to a dictionary. When the abbreviation is subsequently entered, it is automatically changed to the fully expanded word or phrase.

Ease of use

Much of the design effort for Impression has gone into the user interface. The program has the minimum of menu options (only 6 main menu items), so new users are not overwhelmed by dozens of menus. Full use is made of dialogue boxes which can remain on screen while editing continues. For example the 'Alter graphic' dialogue, illustrated opposite, will remain on screen and dynamically indicate any alterations performed to the graphic with the mouse. The result is that, although Impression is more powerful than any alternative, it is actually simpler to learn and easier to use.



Fonts are listed by family so reducing the size of menu and making it easier to select any required weight.

RISC OS

Impression is totally RISC OS compatible and follows the Acorn RISC OS guidelines. It integrates with other programs and supports in-memory transfer with co-operating applications. For example importing a picture from !Paint, !Draw or ScanLight involves simply dropping the appropriate icon onto a blank frame in an Impression window.

Impression can access the full RISC OS character set that includes a complete set of European characters. European versions (with translated manuals, menus etc) are available.

!Draw. The scanned image was obtained using Scan-Light Junior. Proofs were produced on a LaserDirect printer (90 seconds for all 4 pages).

The



family

Impression 2 is part of a family of products that includes Impression Junior, a low cost, less capable, yet fully compatible version of Impression. The family therefore covers the broadest possible spread of requirements. All versions can be upgraded to more powerful versions - Junior to Impression 2 for the difference in price, Impression release 1 owners can obtain a free upgrade to release 2. All Impression owners get a regular newsletter, upgrades to future versions and the support of the largest, and oldest, software house in the Acorn market.

Unique Impression points

We could list dozens of features but the following is a list of some of the more important features that we believe set Impression apart from any other word processor or DTP program.

The Impression style system
Graphics rotate
Graphics grey-level dither
Group and multiple frame operations
The spelling checker
Built-in hyphenation
Documents larger than memory
Supremely fast and responsive
Index and contents compilation
Draft and RISC OS quality printing
18 quality outline fonts included
Retro-active master pages
Word substitution as you type
Graphics flowing within the text
The range of printing options
The ease of use
The shortest learning curve
Impression Junior
The history and experience of the Impression developers and the sheer number of man-years of effort put into this product.

Computer Concepts Ltd

Gaddesden Place, Hemel Hempstead, Herts. HP2 6EX
Tel 0442 63933 Fax 0442 231632

Educational discounts

A range of educational discounts, site licences and network licences are available for both Impression release 2 and Impression Junior. Contact Computer Concepts for details.

The package

The package includes: A 300 page manual with reference, introduction, tutorial section and index; the acclaimed 'DTP at a glance' introduction to desk top publishing; five discs including Impression and installation program, a selection of extra utilities (such as the previously mentioned text to Draw converter and a utility that provides over a dozen new screen modes for both normal and multi-sync monitors), a selection of clip-art and example graphics, printer drivers (licensed from Acorn) for a wide range of dot matrix, laser and ink jet printers. 18 quality outline fonts. (12 licenced from Acorn). It also includes 8 non outline, character mode fonts.

Impression is compatible with all (the every growing number of) RISC OS outline fonts and can access all weights of all fonts. The following shows some of the (over 200) symbols from the Dingbats font included as part of the set.



Money back guarantee

Your guarantee of satisfaction is that when purchased direct from Computer Concepts, Impression 2 is offered with a full 'no quibble' money back guarantee.

£169.00 +VAT (£194.25)

Send for fact sheets on technoSCAN, technoTablet, Multipod & Hard Disk Upgrades

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technoTablet

Our 12" by 12" working area technoTablet offers a resolution of 1000 lines/in and connects through the serial port of the computer. The tablet can take over virtually all the functions of a mouse simplifying the use of graphics packages.
A four button puck moves over the special surface, its cross-wires allowing simple and accurate transfer of drawings. The optional stylus will make tracings, line drawings etc much easier and more accurate.
The driver software is genuine RISCware and provides commands to turn the tablet on or off, select relative or absolute coordinates, change puck movement sensitivity and scaling.
The package includes the tablet, puck, software and mains power supply, no connections are required to the ARC main board.

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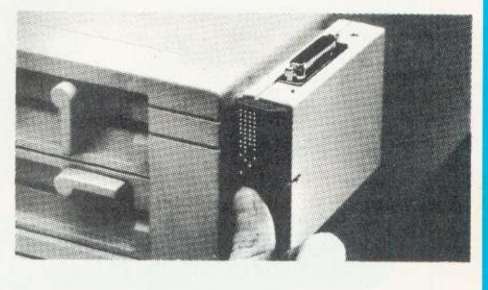
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Cable sets for above sharers available for all popular computers

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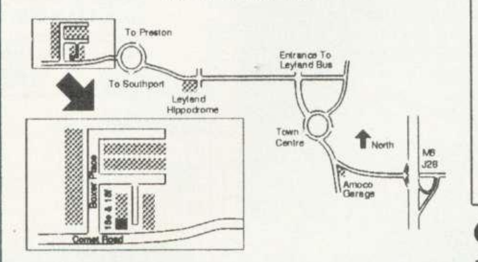
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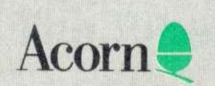
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(Extended by Popular Demand)

When you purchase an Archimedes Micro from Watford, look what you get FREE with it

Micro	Free Offer
A410/1	Upgraded to 2MB RAM & a 20MB Hard Disc, (A420)
A420/1	Upgraded to 4MB RAM 40MB Hard Disc (A440) + MK II Learning Curve pack (Incl. Acorn DTP)
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Increase the speed of your Archimedes by a factor of THREE to SIX times (depending on the software you are running), with Watford's ARM3 Upgrades.

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All our memory upgrades are simple to fit. No soldering required. Fitting instructions supplied.

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- **R414**-A410/1 – to 4MB RAM Upgrade **£173**

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Watford's Hard disc drives for A310 & A410 series fit internally into the space provided. The 'simple to follow' fitting instructions supplied makes drive fitting very easy. All disc drives are self parking. 40Meg & 53Meg drives are fast 24mS type, while 20MHz are 28mS.
P.S. A310 upgrades require a backplane and a fan.

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- **3HD50** – 53Meg H' Disc + Podule for 310 **£474**
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- **4HD40** – 40Meg Hard Disc for 410 **£269**
- **4HD50** – 53Meg Hard Disc for 410 **£399**
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Sporting Triangles	£24
Superior Golf	£17
Talisman	£14
The Pawn	£19
Thundermonk	£11
White Magic	£15
Xtra 100	£15
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* Requires System Delta

ULTIMUM – Archimedes A3000 Podule Racking System



- Accepts Standard Archimedes Podules – does not need special mini podules!
- Provides up to 4 Podule Expansion (including Hard Drive Podule)
- Internally mounted Podules (Neat & secured)
- Extremely simple to install – Just Plug in connections and go
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- IEC mains o/p socket for monitor
- Internal Hard Disc Drive option
- Sturdy Steel construction in matching Acorn beige
- Full access to internal floppy drive & reset switch
- Convenient and attractive monitor stand

THE ONLY LOGICAL WAY TO EXPAND YOUR A3000 COMPUTER

The accepted standard for Archimedes computer expansion is the Acorn Podule, designed initially to fit the old 310, and also for the later A400 and A400/1 series micros. The podules fit inside these computers up to four at a time. The A3000 is the little brother of the family, but can only have one podule at a time, plugging into the back of the computer.

Other attempts have been made to expand the A3000 by trying to introduce a 'mini-podule'. This is impractical for many reasons, amongst which is the reluctance of manufacturers to produce them. Nobody wants to re-design podules already produced. Some cannot be produced on a 'mini-podule' as they are far too complicated and simply wouldn't fit.

Watford Electronics listens to the demands and requirements of its customers, and we are glad to say that we have come up with the only real solution to the A3000 expansion problem. The ULTIMUM Podule Racking System allows up to three FULL SIZE standard Archimedes 300/400 series podules to be fitted to the computer. In addition, there is also provision for a hard disc drive and a podule to be fitted internally.

Since the ULTIMUM Podule Racking System takes proper full size podules, you will be able to use any of the currently available peripheral equipment, from companies like Computer Concepts, Armadillo, Acorn and of course, our own brand.

Fitting the podules to 'ULTIMUM' is simple. They are neatly fitted inside the metal case of the rack, avoiding the previously untidy method of hanging the podule off the back of the computer, risking damage to both, it and to the computer.

'ULTIMUM' has its own power supply, so no strain is put on the A3000 power supply. There is also an IEC mains output socket for an Acorn type monitor so reducing the number of plugs required to go to the mains. The ULTIMUM is rigidly clamped over the top and under the computer, and allows direct access to the floppy disc drive and reset button, rather than obstructing access as on other systems. One can also place a standard monochrome or 14" colour monitor (even a multiscan type) safely on top. The mounting method employed is so firm that the computer could even be safely transported without the assembly falling apart.

By popular demand, we are now able to supply refurbished and fully guaranteed, Acorn range of Micros.
(Please telephone for price & availability)

Archimedes to BBC Serial Link Mk 2

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers.
New RISC OS Version **Only £15**

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With this interface it is possible to connect almost any 5.25"/3.5" disc drive with its own power supply to the Archimedes. Upto 4 disc drives can be connected. NO SOLDERING is involved. Supplied complete with necessary lead.
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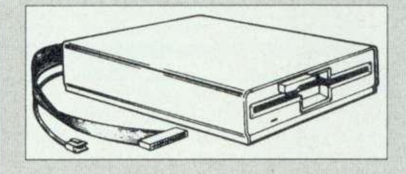
Special Education Prices

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FREE OFFER



A 5.25" Double Sided, 40/80 track switchable 400K Disc Drive complete with cables and a Utilities disc incl. 2 games, plus

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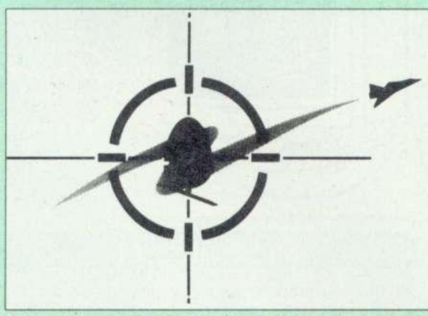
FREE with every BBC Master purchased from us during October

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(Carr. £2 to £7 depending on the weight)

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Only: **£195** (Carr £4)

FREE

With every Z88 purchased from us, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

ACCESSORIES

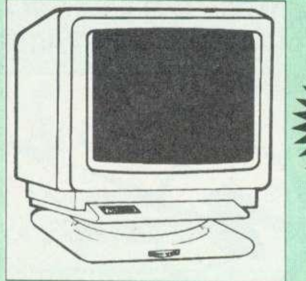
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AA Nicad Rechargeable Battery	£1.50		
Battery Charger Compact & Fast	£6		
Z88 Serial Printer Cable	£9		
Z88 Parallel Printer Cable	£25		
Z88 to Archi Link	£15		
Z88 to BBC Link	£20	Z BASE	£56
Z88 to PC Link II	£30	Z TAPE	£42
Z88 to Macintosh	£52	Z TERM	£42
Z88 Mains Adaptor	£9	Z88 Modem	£149



CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Continued→ → → → → → → → →

Monitors





Microvitec 14"

- **1431** – Standard resolution as used on the BBC television computer programme £175
- **1451** – Medium resolution, suitable for word processing in mode 0 £219
- Cub3000 Medium Res for A3000 £195
- **1455** – MS Medium resolution, ideal for Archimedes £220
- **1441** – High res, exceeds the capabilities of the BBC Micro £359
- **1451AP** RGB + PAL and AUDIO £255
- **2040 CS** 20" Hi Res £675
- Dust Cover for Microvitecs £5.50
- **Touchtec 501 Touch Screen** £239

14" Multiscan Colour

- **TAXAN** 775 Plus – 0.28 Dot pitch Ultra high resolution, anti-static screen scanning Ultra High Res £429
- **TAXAN** 770LR Low Radiation Multiscan £425
- **PANASONIC** – 14" Super High Res. 0.29" Dot pitch, non glare screen. Built-in Swivel base **Launch price £349**
- **EIZO** 9060SZ Low Radiation, Super High Resolution, Antistatic screen, multiscan monitor for a wide range of applications. 800 dots x 600 lines. Display for high res VGA. 0.28 Dot pitch £409
- **EIZO** 9070S 16" Low Radiation .28 Dot pitch. As used on Archi 540/1 £625

Philips

- **BM7502** 12" Hi-res Green Monitor £70
- **CM8833** 14" Med. Res Colour Monitor £215

STAR BUY

- **PHILIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £189

Dust Cover for Philips Monitors £6
(Securicor carriage on Monitors £7)

Swivel Bases

By simply placing your monitor on one of our front adjustable professional swivel bases (see drawing at the top), you can easily adjust the viewing angle.

for 12" Monitors **£8** (carr. £2.50)
for 14" Monitors **£12** (carr. £2.50)

Anti Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

£12

Spare Monitor Leads

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3
Archimedes Colour Monitor Lead	£7.50

FREE On-Site Maintenance

This month we are also offering at no extra cost to all our customers, 12 months, On-Site Maintenance on all Microvitec and Multiscan colour monitors; all Panasonic, Hewlett Packard, Roland Plotters and Laser Printers; and of course the full range of Archimedes micros. Should the machine fail, simply telephone the maintenance engineer, who will call in within 12 working hours.
(Offer applicable only when bought at prices advertised in this advert).

Concept Keyboards

Standard A3 Keyboard with BBC Software	£143
Standard A4 Keyboard with BBC Software	£117
Archi A3 Keyboard	£144
Archi A4 Keyboard	£118

Roland Plotters

(Official Roland Appointed Distributor)

- **DPX 2500** £2435
- **DXY 1100** £545
- **DXY 1200** £715
- **DXY 1300** £925

Panasonic Printers

12 MONTHS FREE MAINTENANCE ON SITE

- **KX-P1081** 9pin 80col. 144/28 cps £124
- **KX-P1180** 9pin 80col. 192/38 cps £134

FREE with every KX-P1081 & KX-P1180:
A printer lead (please specify type required) and a Dump Out 3 ROM for the BBC Micro or 1,000 sheets of fanfold paper for other micros, please specify)

Various Panasonic Printers

- **KX-P1124** 24pin 80col. 192/63 CPS £185
- **KX-P1540** 24pin 136col. 240/80 CPS £390
- **KX-P1592** 9pin 136col. 216/45 CPS £275
- **KX-P1595** 9pin 136col. 288/61 CPS £345
- **KX-P1624** 24pin 132col. 192/63 CPS £318
- **KX-P1695** 9pin 132col. 330/86 CPS £320
- **KX-P1123** 24pin 80col. 192/63 CPS £199

Panasonic Accessories

Cut Sheet Feeders

KX-P1592/1595 (P32)	£175	KX-P1540 (P35)	£175
KX-P1124 (P36)	£85	KX-P1180 (P37)	£79

Buffers

P12	4K buffer Board for 1081	£55
P42	32K buffer Chip for 1592/1595	£16
P43	32K Buffer Chip for 1540/1124/1180	£16

Serial Interfaces

P17 P1081/1592 £32 **P19** P1124/1180 £55

Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110 for KX-P1081, 1592 & 1595	£8
P115 for KX-P1180	£8
P145 for KX-P1124	£8
P140 for KX-P1540	£10
Colour Ribbons for KX-P1081, 1592 & 1595 Brown, Blue or Red	£9.95 each

Integrex Colour Jet

- Colour Jet 132 Printer £515
- Paper Roll £6.50
- Screen Dump Software £10
- Colour Cartridge £19.50
- Colour Textile Cartridge £29
- Black Cartridge £11.25
- Black Textile Cartridge £17
- 100 A4 OHP transparencies £55
- 8K Serial Interface Optional £123

Canon Printer

Canon Bubble jet BJ 130E £435

Citizen Printer

120D Plus	£105	Swift 9	£198
Prodot 9	£275	Prodot 24	£275
Swift 24	£238		

Swift 24 Colour Option £34
Swift 24 Colour Ribbons £13

Hewlett-Packard Printers

- HP Desk Jet + £339
- HP Paint Jet Col. £676
- HP Thinkjet £250
- HP Quiet Jet Plus £415
- HP Scan Jet + £1199
- HP Desk Jet Cart. £15
- HP Desk Writer £620
- Desk Jet 500 £379

Star Printers

- **LC10** 9pin 80col. 144/36 CPS £119
- **LC10** Colour 9pin 80col. 144/36 CPS £158
- **LC10-II** 9pin 80col. 180/45 CPS £145
- **LC15** 9pin 136col. 180/45 CPS £250
- **LC24-10** 24pin 80col. 180/60 CPS £185
- **LC24-15** 24pin 136col. 200/67 CPS £315
- **XB24-10** 24pin 80col. 240/80 CPS £379
- **XB24-15** 24pin 80col. 240/80 CPS £489
- **XB-24** Colour Kit £35
- **LC-200** Colour 9pin 80col. 180/45 CPS £185
- **LC-24-200** 24pin 80col. 222/67 CPS £229
- **LC24-200** Colour 24pin 80col. 222/67 CPS £265

Star Accessories

Cut Sheet Feeder

LC10/LC24-10	£65	LC15/LC24-15	£125
XB24-10	£80	XB24-15	£139
LC24-200	£63		

Serial Interfaces

SPC-10 LC10; LC10-II; LC10-Col; LC15; LC24-10; LC24-15; LC-200; LC24-200 £49
8K Ser LC-200; LC24-200; FR10; FR15; XB24-10; XB24-15 £64

Paper Roll Holders

LC-200; LC24-200; LC24-200 colour £29

Buffers

32K Ram Card for LC24-10; 15 & 200 £55
32K Ram Card for XB24-10 & 15 £55

Ribbons

LC10; LC10-II; LC15	Black £4
LC10; LC10-II; LC15	Colour £6
LC-200; LC24-200	Black £5
LC-200	Colour £11
LC24-200	Colour £12
XB24-10; XB24-15	Black £5
XB24-10; XB24-15	Colour £12

Laser Printers

Canon LBP-4	4ppm	£825
Canon LBP-8 III	8ppm	£1299
Epson GQ500	6ppm	£835
HP Laserjet IIP**	4ppm	£725
HP Laserjet IID	8ppm	£1820
HP Laserjet III	8ppm	£1199
HP Laserjet IIID		£1875
Panasonic KX-P4420	8ppm	£785
Panasonic KX-P4450i	11ppm	£1185
Panasonic KX-4455 Postscript	11ppm	£1799
Qume Crystal Print WP+		£749
Qume Crystal Print Ser. 2		£1065
Qume Crystal Print Publisher 2		£1899
Star LP-8 II		£1099
Star LP-8 Star(post)script		£1575

** Lower Paper Cassette Tray & Premier Collection Software, FREE with every HP Laserjet IIP printer purchased from us. Offer subject to availability.

Laser Toners

Canon 2	£59	Laserjet II	£65
Canon 4	£60	Laserjet IIP	£60
Epson GQ	£18	Panasonic	£25
Star	£59	Qume Crystal	£63

Laser RAM Upgrades

HP Laserjet II RAM		GQ5000 512k	£99
Jetware II 1MB	£175	KX-P4420	1M £249
Jetware II 2MB	£330	KX-P4450i	1M £299
Jetware IIP 1MB	£199	KX-P4450i	2M £575
Jetware IIP 2MB	£319		

Epson Printers

EX800	**£410**	LQ1050	**£540**
EX1000	**£540**	LQ1060	**£649**
FX850	**£299**	LQ2550+	**£760**
FX1050	**£370**	LX400	**£120**
FX1060	**£679**	LX850	**£179**
LQ400	**£182**	SQ850	**£515**
LQ550	**£269**	SQ2550	**£789**
LQ850	**£439**	TLQ4800	**£1449**
LQ860 Colour	**£535**		

Cut Sheet Feeders for

EX800/FX800/850/LQ800/850	**£130**
FX1000/LQ1000/1050	**£175**
LQ2550	**£390**
LX400/800/850/LQ400/500/550	**£69**

Tractor Feed for

LQ800 **£44**; LQ850/FX850 **£69**; LQ1050/FX1050 **£85**; LQ2500 **£90**; LQ2550 **£90.**

Accessories

- EX800/1000 Colour Option **£45**
- EX800/1000 Colour Ribbon **£14**
- LQ2500 Colour Option **£65**
- Multifont Card for LQ550/850/1050 **£95**

Epson Printer Interfaces

All these interfaces fit inside the printer

RS232	**£32**	RS232 + 2K Buffer	**£52**
IEEE 488	**£40**	RS232 + 8K Buffer	**£79**

Printer Leads

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Archimedes Printer Lead 6'	£6
Nimbus Centronics Lead	£6
IBM/Archimedes Parallel Lead 6'	£6
IBM/Archimedes Parallel Lead 5 metres	£13
IBM/Archimedes Parallel Lead 10 metres	£19
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.
IBM Keyboard extension lead coiled	£5

Important Notice to All our Customers

Watford Electronics only supplies products fitted with British Specification 240V AC Mains 3 core cable with connections for Live, Neutral and Earth. We do not sell, nor intend to supply grey imports from Europe with incorrect 220V European mains connections (2 core cable!) which could be dangerous to the end user.

Megabuffer 256



The Smallest 256K Printer Buffer Unit in the world **38mm x 130mm x 134mm.**

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. The features are:

- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatiblity with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in text unit for both the buffer & your printer.

Only £119 (carr £5)

Universal Printer Sharers/Changer

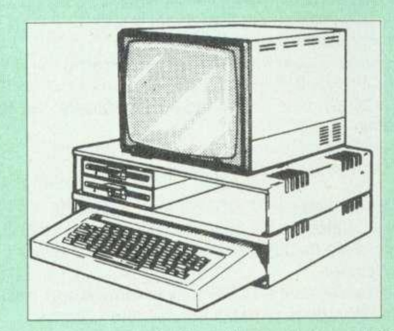
Connect upto 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spaghetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments)

Connects	Serial	Centronics	P&P
2 to 1	£16	£17	£3
3 to 1	£22	£24	£3
5 to 1	£–	£32	£4

(Cables extra at £6 each. Please specify type required when ordering)

Plinths for BBC Micro, Master & Printer



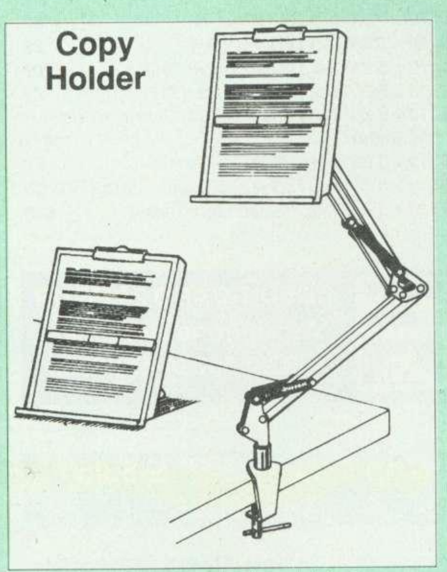
Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid.

The single printer stand is equally sturdy but instead of cooling slots it has elegant cutouts on the sides. This allows easy access to paper from all sides. Colour: BBC Beige.

Single BBC Plinth	420 x 310 x 105mm	**£13**
Double BBC Plinth	420 x 310 x 210mm	**£24**
Printer Plinth	420 x 310 x 105mm	**£12**
Single Master Plinth	490 x 310 x 105mm	**£14**
Double Master Plinth	490 x 310 x 210mm	**£26**

(Carr. Single plinth £2; double plinth £3)

Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding your paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£7** (carr. £3)

Angle poise **£12** (carr. £3)

Listing Paper (Perforated)

- 1,000 Sheets 9.5" x 11" Fanfold Paper **£7**
- 2,000 Sheets 9.5" x 11" Fanfold Paper **£11**
- 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold **£21**
- 1,000 Sheets 15" x 11" Fanfold Paper **£9**
- 1,000 Sheets true A4 Fanfold Paper 70gms **£11**
- 2,000 Sheets true A4 Fanfold Paper 70gms **£21**
- Teleprinter Roll (Econo paper) **£4**

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

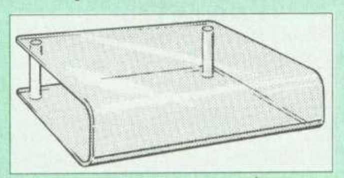
Printer Labels

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	**£5.00**
1,000 90 x 36mm (Twin Row)	**£4.90**
1,000 90 x 49mm (Twin Row)	**£7.50**
1,000 102 x 36mm (Twin Row)	**£6.25**

Carriage on 1,000 Labels £1.00

Perspex Printer Stand

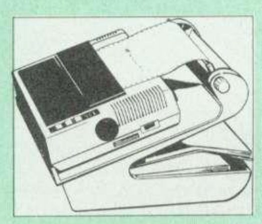


Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version **£16** (carr £3)

136 Column version **£20** (carr £4)

Professional Printer Stand



The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Its ergon-omic design ensures smooth paper flow and automatic refolding.

80 Column version £23 (carr. £3)

132 Column version £28 (carr. £4)

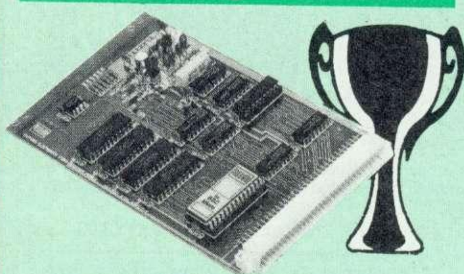
Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
Brother HR15/20	**£3.50**	–
BBC Micro	–	**£3.50**
BBC Master	–	**£4.00**
Archimedes Micro pair	–	**£9.00**
Citizen 120D	**£2.75**	**£4.50**
DMP2000	**£2.75**	**£4.75**
EX/LQ800	**£3.50**	**£4.50**
EX/LQ1000	**£3.50**	**£5.00**
RX/FX80/85/800/MX80	**£2.95**	–
FX/MX/RX100/1000	**£3.95**	–
Kaga/Taxan KP810/815	**£3.25**	**£5.00**
LQ500/550/800/850	**£3.25**	**£6.00**
LQ1050/LQ2500	**£4.00**	–
LX80/86/800/850	**£2.75**	**£4.50**
M1009/GLP	**£2.95**	**£3.75**
NEC P2200	**£4.50**	**£5.00**
Panasonic KX1080/81	**£3.25**	**£4.75**
Panasonic KX-1124	**£7.50**	**£5.00**
SQ2500	**£23.00**	**£5.50**
Star LC10/NL10	**£2.75**	**£5.00**
Star LC24-10	**£2.95**	**£6.00**
Olivetti Ink Jet Cartridges (set of 4)	**£9**	

Our attractive Dust Covers are manufactured from translucent PCV. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Continued→ → → → → → → → →

Archimedes Real-Time Digitiser



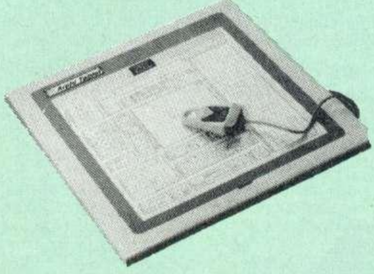
Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £175

A Set of Colour Filters for colour image grabbing using a video camera	**£16**
New Risc-OS Software Upgrade	**£39**

Archi Graphic Tablet



The Archi Graphic Tablet offers performance and accuracy comparable to other tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely. The package is supplied complete with sophisticated Archi software. (Now, fully LinCAD compatible. Recommended by Linear Graphic).
(FREE this month, PC Mouse Drivers & Art package)
(Now, fully LinCAD compatible. Recommended by Linear Graphic).
(FREE this month, PC Mouse Drivers & Art package)

Special Price £225

(Price includes Tablet, Leads, Software & Puck)
Stylus Optional Extra **£29**

Disc Plonker Rack



When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the harzards of fingerprints, scratches, dust, coffee and an untidy desk. Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: **£2**

Acorn & Watford DFSs

● Watford sophisticated DFS ROM	**£16.00**
● Watford DFS Kit complete	**£69.00**
● We will exchange your existing ROM for Watford's ultimate DFS ROM at only	**£12.00**
● DFS Manual (comprehensive)	**£6.95**
● Acorn DNFS ROM	**£17.00**
● Acorn ADFS ROM only	**£25.00**
● Acorn 1772 DFS ROM Kit	**£49.00**

(The single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with the their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

Watford's MkII 1772

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£39.00.**

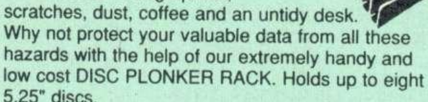
● SPECIAL PRICE	**£44.00**
● DDFS Manual (No VAT)	**£6.95**
● We will exchange your existing DFS Kit for our sophisticated DDFS for only	**£30.00**

Please note, as the MkII DDFS is a hardware and sofware upgrade, it is not possible for existing Watford DDFS users to simply exchange the ROM for the new version.

3M – Diskettes

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor

● *10 x 5.25" S/S D/D 40T (744)*	*£5*
● *10 x 5.25" D/S D/D 40T (745)*	*£5*
● *10 x 5.25" S/S D/D 80 Track (746)*	*£7*
● *10 x 5.25" D/S D/D 80 Track (747)*	*£7*
● *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT*	*£11*
● *10 x 3.25" S/S D/D 40/80 Track*	*£7*
● *10 x 3.25" D/S D/D 40/80 Track*	*£8*
● *10 x 3.5" Double Sided High Density*	*£15*



CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Top Quality 3.5" & 5.25" Diskettes

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

● *10 x **M3** 3.5" D/S D/D 80 Track*	*£7*
● *10 x **M9** 3.5" D/S High Density*	*£14*
● *10 x **M4** 5.25" S/S D/D 40 Track*	*£5*
● *10 x **M5** 5.25" D/S D/D 40 Track*	*£5*
● *10 x **M7** 5.25" D/S D/D 80 Track*	*£7*
● *10 x **M8** 5.25" D/S H/D Hi-Density*	*£11*
● ***M2** 3" Double Sided*	*£2.50 each*

Floppy Head Cleaner Kit

The heads in floppy drives are precision made and very sensitive to dirt. The use of cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

Antistatic Lockable Disc Storage Units

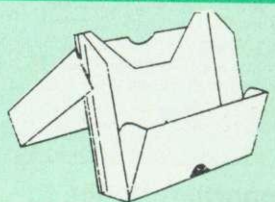


Gives double protection – Strong plastic case that affords real protection to your discs.
Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.
Dividers and adhesive title strips are supplied for efficient filing of discs.

● **M35** – holds up to 50 5.25" discs	**£4.95**
● **M85** – holds up to 95 5.25" discs	**£6.95**
● **M25*** – holds up to 25 3.5" discs	**£4.95**
● **M50** – holds 50 3.5" discs	**£6.50**
● **M10** – holds 8 of No. 10 Data Cartridges	**£15**

* Not lockable

Plastic Library Cases



Holds up to 10 5.25" Discs. **Only £2.00**

Dust Covers (For our Disc Drives)

Single CLS (without PSU)	**£3.20**
Single CS (with PSU)	**£3.25**
Twin CLD (without PSU)	**£3.85**
Twin CD (with PSU)	**£3.90**

Disc Albums

Attractively finished in black leather-look vinyl. Stores up to 20 discs. Each disc can be seen through the clear view pocket.

£4

Special Bulk Offer on Discs

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)



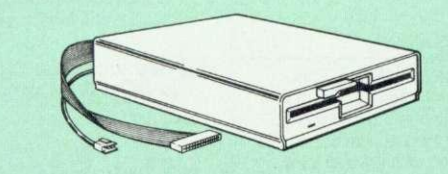
BULK PACK DISCS in lots of 100

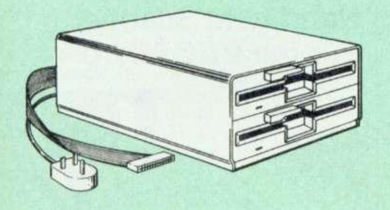
Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves 5.25"	£30	£35	£40
● With Sleeves 5.25"	£33	£38	£43
● 3.5" D/S D/D	£22 for 50		£40 for 100

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.
The tinting of the boxes indicates 40/80 track switchable disc drives. For ease of use, the switches are mounted on the front panel.
***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*
Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high qulity NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public. If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.
*Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. **Ideal for Schools & Colleges.***
When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. (Turn to the 4th page of our advert for the Plinths).
P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

Our Disc Drives conform to BS415





"Test Bureau Approved for Use in Education"

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
400K (720K)	CLS400S £74		CS 400S £83	
800K (1,44M		CLD 800S £149		CD 800S £162
● TWIN Disc Drive Case, complete with Power Supply & Cables **£43** **Securicor carriage on Disc Drives £6 to £7**				

Prefix ***C** = Cased Drive*
***L** = Less PSU*
***S** = Single*
***D** = Double*

Suffix ***S** = 40-80 Switchable*

e.g. *CLS400S = Cased Disc Drive, Less power supply unit, single 5.25" 400K, (720K in double density); Double sided; 40/80 track switchable.*

Refurbished Disc Drives now available
CLS400 £50; CLD800 £98; CS400 £59; CD800 £115

Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

Special 40/80 Disc Drive/DDFS Mk II Offer



- The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both Single & Double Density modes.
- A comprehensive User Friendly Manual.

A Bargain at Only **£119** (£7 carr) (Offer valid while stocks last)

3.5" DISC DRIVE OFFER



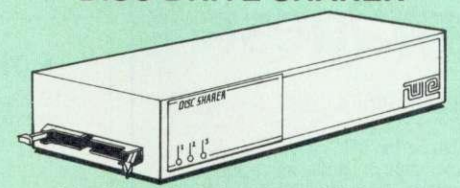
These top quality 3.5" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Drives to connect to BBC Micros own PSU
- **CLS35 400K Unit £65**
- **CLD35 Twin 800K £119**

Drives with built-in Power Supply Unit
- **CS35 Single 400K £85**
- **CD35 Twin 800K £129**

(P.S. CS35 Single is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage).

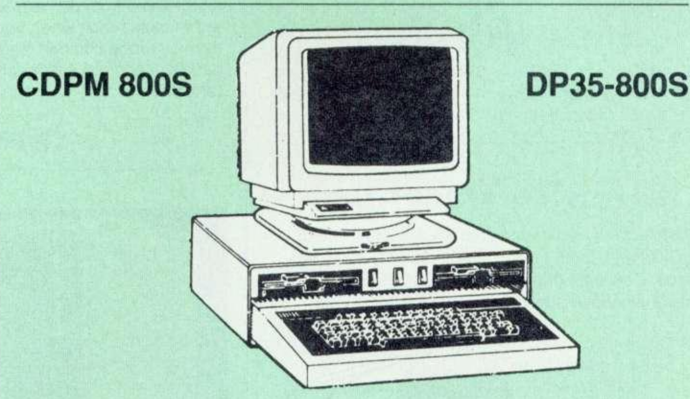
DISC DRIVE SHARER



(Ideal for educational establishments)
At last, a low cost alternative to the Econet system.Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Offer Price : **£55** Price includes 3 Cables

CDPM 800S DP35-800S



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

CDPM 800S for the BBC B & Master £175

A Double disc drive with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master series is the 5.25" disk, the standard of the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

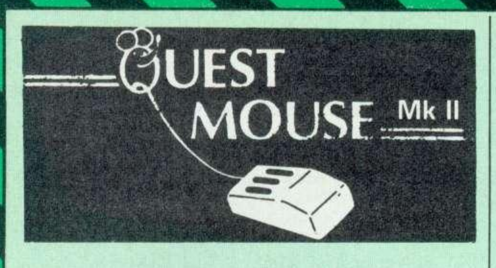
To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S. It contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

The 5.25" disc drive is 40/80 track switchable. DP35-800S has its own power supply, independent of the BBC Micro.

DP35-800S for BBC/Master £165

(Securicor Carr. £7)
(The above drive units are 2 Megabytes unformatted)

Continued→ → → → → → → → →



- Quest Mouse II & Quest Paint £58
- Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont £89
- Quest Mouse II only £29
- Quest Paint Software only £34
- Quest Font Disc (22 Text Fonts) £15
- Quest Mouse Mat (Red or Blue or Green please specify) £3
- Part Exchange your unreliable AMX Mouse for a Quest Mouse for only £22

(P.S. Quest Paint is not compatible with BBC Compact)

Quest Paint is the winner of the BBC Acorn User 1990 Award for the Best Art/Graphics software



Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

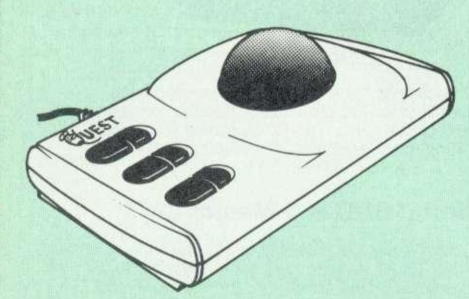
ConQuest ROM Package £30
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro £39

QUEST – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.



QT-10 BBC/Master Version **£32**
QT-20 Archimedes Version **£35**

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible)	£45
RB2 including Quest Paint	£75
RB2-A for Archimedes	£46

THE NEW Mk III AMX MOUSE

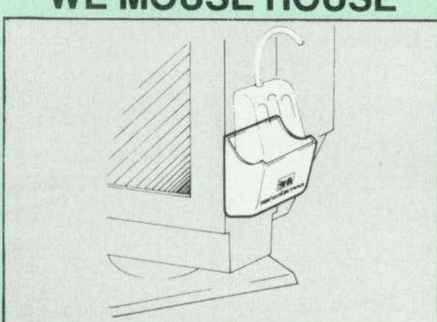
Inc. Super Art package

ONLY: £59 (carr £3)

(Please specify for BBC, Master or Compact)

MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£32
PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£13
AMX DESIGN (ROM)	£55
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£20

WE MOUSE HOUSE



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk. It protects it from damage when not in use, yet within easy reach when you need it again. There is also a second compartment for your pens and pencils – and at £4 it doesn't cost a rodent's ransom.

Price £4



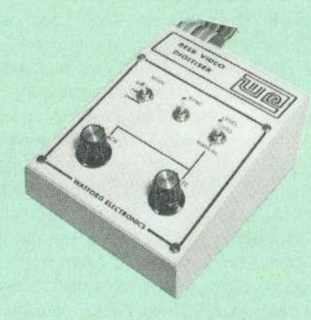
Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

Only £21

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Admin Xtra Disc Utility	£13
Fonts N Graphics Disc Utility	£13

BEEB VIDEO DIGITISER



"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.
This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket. The software supplied includes a sophisticated, fast screen dump routine.
Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

£109 (Carr. £5)

(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

The Beeb HandScan Hand-held Scanner for the BBC Micro

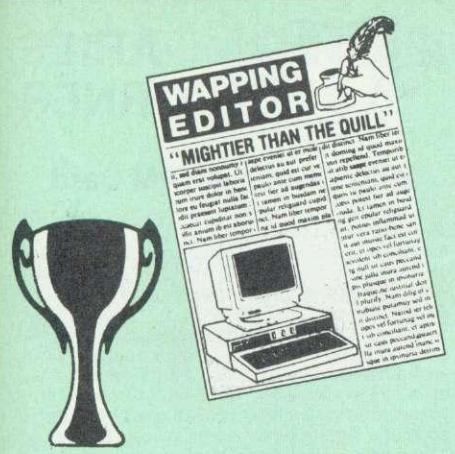


Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer the BBC Micro computer.

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware £135



Winner of the BBC Acorn User 1990 Award for the Best DTP/Word Processor

The Wapping Editor

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

Page Layout Section

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module incorporates the facilities like: pencil, brush, airbrush, polygon, circle, eclipse, fill, cut & paste, etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

Word-Processor

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

The Font Editor

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individually proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.

Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser.

Wapping Editor Software Pack	**£69**
Wapping Editor plus Mouse	**£89**

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

Wapping Font Disc 1

Sixteen Wapping Editor fonts including smaller versions of Oberon and Daisy and two new sizes of the standard font.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions.

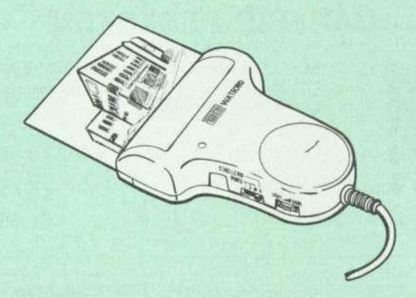
£12

Wapping Font Disc 2

This new addition to our Wapping range of DTP software provides you with additional 23 fonts.
On 80 track disc only

£13

Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system. The package includes the most comprehensive utility software available for the Archimedes, a high quality, ergonomically designed to fit the shape of your hand, (see drawing above) scanner, which is fitted with a warning LED that will indicate if the scanner is being moved too quickly for accurate results. Additional twin guide rollers ensure precise tracking over the image, to make the best use of the high resolution available with this system. The yellow/amber illumination of our Mk II scanner, enables you to achieve optimum accuracy. It is capable of scanning upto an amazing 400 DPI. The scanning area is 4" wide and the height is only limited by the maximu amount of memory available.

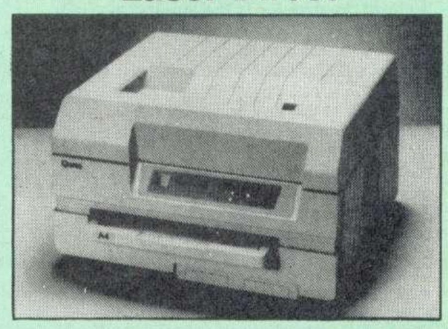
On board ROM software supplied, is the most sophisticated Archimedes scanner software yet written.

AHS-4	**Archi 300/400 Version**	**£149**
AHS-3	**Archi A3000 Version**	**£175**



CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Laser Direct



By using the power of the Archimedes RISC processor, it offers the best of both worlds – print speed up to 5 times faster than typical Laserjet compatibles – uses outline fonts so that any font can be scaled to any size – works with all programs that use RISC OS printer drivers. Ideal for use with Genesis, !Draw, Acorn DTP, Impression, etc. Includes 50 sheet paper tray and a single sheet/envelope tray. Requires one expansion slot and at least a 2Mbyte Archimedes. A very compact printer, a very low initial cost and very low running costs.

Launch Offer: £849

(For demonstration, call in at our retail shop)

ArcLaser

ArcLaser uses the considerable power of the Archimedes to control the Laser printer directly via a very high speed interface software. This gives speed and economy. The Scaleable fonts facility enables every font to be scaled to any size at 400 dpi, and in portrait or landscape mode. Full Page Graphics produced in 20 to 60 seconds at 300 dpi typically.

Introductory Offer:£799

NEW

Beeb PC (BASIC)

Beeb PC Basic is designed for program authors wishing to convert programs so that they will run on IBM personal computers. To convert BBC BASIC programs manually can waste days of valuable time with every occurrence of common statements such as PROC, DEFPROC, TAB, having to be changed. Beeb PC (BASIC) automates many of these changes, and will convert majority of BBC statements that are invalid for IBM BASIC into equivalent acceptable statements. In addition BBC BASIC data files can be converted to IBM BASIC format, with support provided for all BBC data formats:- INTEGER, REAL & STRING.

Price: £38

Beeb DOS 2.2

The BBC and IBM PC's are the most popular micros in the UK. The BBC is firmly established in the education sector and the IBM is the industry standard in the business world. The pools of information and applications held on these computers are immense, yet the means of passing information between them are very limited. Beeb DOS provides a practical method of transferring information between these two micros.

Beeb DOS is a collection of utilities which run on the PC's and enable it to read and write information on BBC discs. You can transfer files between your PC's 360K floppy, high density floppy or hard disc and your BBC discs. In addition Beeb DOS allows you to catalogue, format and compact BBC discs and delete, re-name, lock and unlock BBC files, all on PC's. Each Beeb DOS utility is written in IBM assembler and is run directly from PC or MS-DOS. The Beeb DOS utility can be run from floppy disc, hard disc or RAM drive.

Beeb DOS is supplied on an IBM 5.25", 360K disc complete with a comprehensive operating manual. (Will only work on 360K Disk Drives)

Price: £39

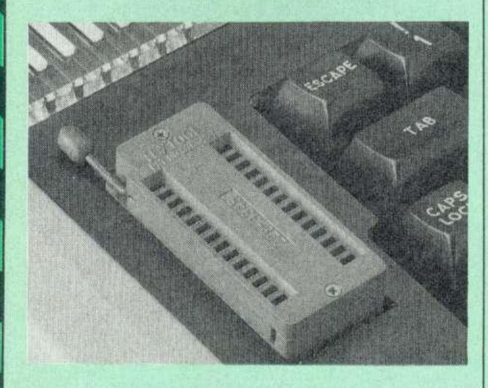
(Please write in for technical literature)

Continued→ → → → → → → → → →

STAFF VACANCIES

Watford Electronics is the leading supplier in the Acorn computer field and has established itself in the PC compatible market with its Aries PC computers. In its eighteen year history, Watford has always kept itself at the forefront of the new technology. Due to our latest expansion, we require staff to man our BBC/Archimedes and PC Technical Departments. Applicants will be required to be familiar with BBC/ Archimedes hardware and software, and PC staff will need to be familiar with PC computer hardware. Good rates of pay, excellent prospects. Subsidised company accomodation is available to single persons if required. Telephone Keith Archer or Richard Overfield for interview, or write to us enclosing your CV.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:

- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery Backup fitted **£39**
Battery Backup only **£3**
16K Sideways RAM **£8.50**
(carriage £3)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

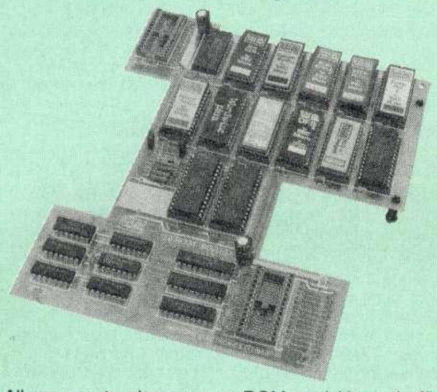
USER PORT SPLITTER UNIT



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

Excellent Value at **£22** (carr £2)

Sideways ROM ZIF Socket System



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£18** (carr £3)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

Complete System	£11
Spare Cartridges	£2.75
Spare Rack	£1.65

ROM Cartridges for the BBC Master
Will accept the new larger Piggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc
Twin **£9;** Quad **£14**

16K Disc Ram Module

(16K Sideways RAM Module)

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances)
- Compact construction
- No overheating or overloading problems.
- Free utilities disc supplied
- Can be used as a 16K PRINTER BUFFER.
- Ideal for profressional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional Battery back-up fitted **£3**



ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved ★FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as th printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on you BBC micro – no flying leads to connect and no soldering. Provision of the onboard ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£69** (carr. £3)

Aries B-12 Sideways ROM Board

The B-12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost

Price:		
	Aries B-12	**£36**
	Aries B-12C	**£5**

ARIES B-488 IEEE-488 INTERFACE UNIT

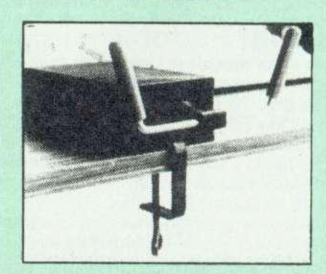
The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

VOLTMACE JOYSTICKS

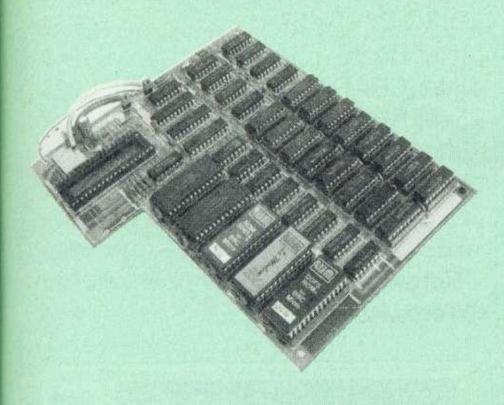
Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£15
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£11
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7
Delta-Cat A mouse eliminator Joystick for the Archimedes	£24

Delta Base B



Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128 **£25**

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 7 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

NTRODUCTORY PRICES:

- ROM/RAM card with 32k dynamic RAM £48
- ROM/RAM card with 64k dynamic RAM £65
- ROM/RAM card with a massive 128k dynamic RAM £109

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

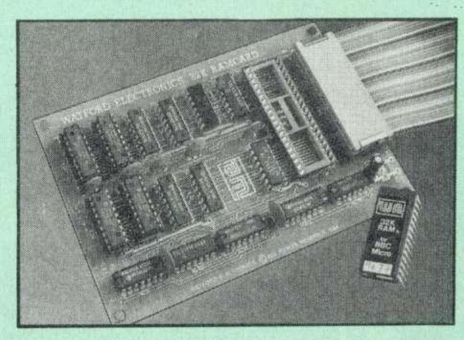
- 16k plug-in Static RAM kit £9
- 16k Dynamic RAM for Upgrade £13
- Battery backup £3
- Read and Write protect switches .... £2 each

Complete ROM-RAM board
All options installed £115

P.S.
IS your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford, ROM/RAM Board and pay £5 less.

32K Shadow RAM/ Printer Buffer Card

Expansion Board



A MUST FOR WORD PROCESSING

Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16k or even 20k, but a massive 32k of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.
- Use the FULL 32k or the bottom 12k of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS432 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138, 145,ADVAL etc). Please note only a 12k printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £59 (carr £3)
(Price includes a comprehensive manual and the ROM)

BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Disc). 4 primary level maths programs — £11.25
- Maths with a Story 2 (Disc). 4 further maths programs. — £11.25
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- BONDING: Science O-Level Chemistry — £20.00
- ELECTROMAGNETIC SPECTRUM (8 Discs) O-Level program. — £20.00
- ELECTRONICS IN ACTION O-Level — £19.95
- NEWTON & THE SPACE SHUTTLE O-Level program. — £20.00
- ECOLOGY O-Level program. — £20.00
- POLYMERS O-Level program. — £20.00
- Classification & Periodic Table O-Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. — £20.00
- FOOD & POPULATION O-Level — £20.00
- MICROTECHNOLOGY (Cassette) O-Level — £11.25
- DEUTSCH DIREKT! (Disc & Audio Cassette) — £19.95
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- ADVANCED TELETEXT SYSTEM — £8.65

Cont.

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- Computers at Work – Primary — £17.35
- Introducing Geography 11-17 years — £17.50
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- Espana Viva – 3 Discs — £19.95
- WHITE KNIGHT Chess game — £16.00
- Inside Science — £22.00
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- **FUN SCHOOL 2 – Green:** 6-8 yrs – Eight programs on Disc, Number Train, Shopping, Maths Maze, Treasure Hunt, Bounce, Packing Caterpillar, 3 Number jump — £12.25
- **FUN SCHOOL 2 – Blue:** Over 8 yrs – Eight programs on Disc, Build a Bridge, Passage of Guardians, Unicorn, Logic Doors, Souvenirs, Code Boxes, Mystery Machine & Escape. — £12.50
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- More French Games – Another 6 games 12 years+ — £26
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- Fun School 2A Green (6-8 years) — £14
- Fun School 2A Blue — £14

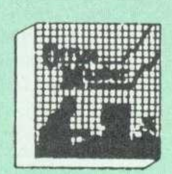
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Watford's own Sophisticated VIEW PRINTER DRIVERS

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CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trial balance.

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STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

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- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features

BEEBPLOT – Provides visual representation from Spreadsheet data.

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Archimedes Hand held Colour Scanner & A4 Page Scanner

MINI OFFICE II

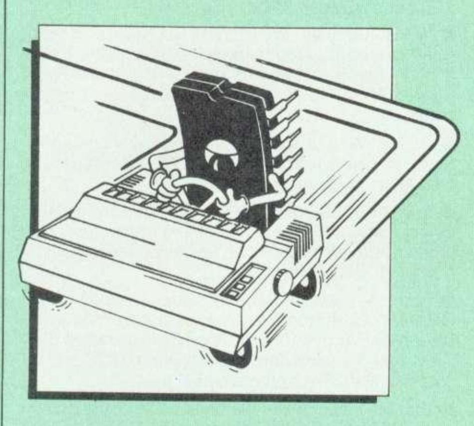
DISC Version for BBC B & B+	**£14.00**
DISC Version for BBC Master	**£16.00**
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(When ordering please specify for which Micro & 40 or 80 track Disc)



CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing at only a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built-in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redifinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute ★ command when printing.

Other features include a very powerful on-screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory-based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips.

Price: Only £33

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Wordwise	**£24**
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Wordwise plus **£40**

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear test-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc interface in your Micro)

BOOK

The Complete Mouse User Guide to BBC Micro

This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.

It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

Price £5.95 (No VAT)

Example programs on Disc £4.95

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THE COMPLETE BBC COMPUTER USER HANDBOOK

"Why has no-one written a book like this before? It's long overdue".

If you own a BBC-B, BBC B+, Electron, Master 128, Master Compact or Archimedes then this book is for you. It shows you how to get the most from your computer, and how to make the computer work for you. Although some sections are machine specific, most of the information, programs, hints and good solid experience are for the whole range of BBC machines. The general style and level means that both beginner and expert will feel satisfied with the quality and quantity of the material.

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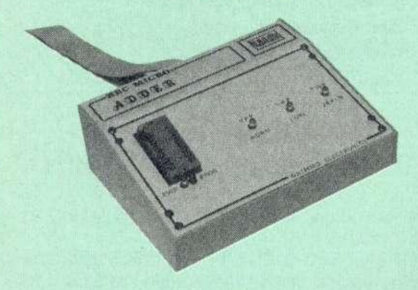
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Special Offer £18

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- NEC Appointed Dealer
- Panasonic Premier Dealer
- Roland Plotter Official Dealer
- Star Printer Sub Distributor
- Taxan Appointed Monitor Dealer
- 3M Media Premier Distributor

ADDER



The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.

Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: 2516, 2716, 2532, 2732, 2764, 27128, & 27256.

£65 (£5 Carr)

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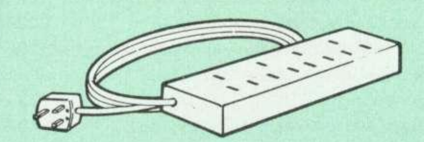
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EIGHT BITS

£5 TILTING CHARACTERS

Martin Osborne of Chesham has written a routine which produces large text characters in mode 7.

This is not really a new routine, but this version is small and neat, and written in machine code, and it is quite a while since this topic was covered in the magazine.

Martin's program works like all programs of this genre. It reads the matrices of the characters from the operating system, using the system call OSWORD &0A, which copies the character matrix into Ram, and then uses this information to graphically plot the characters in a larger size.

In mode 7, each character cell in the 40x25 grid can display a teletext graphic two pixels across by three pixels down, giving a low graphics resolution of 80x75 pixels.

In practice, the 80-pixel width is not achievable because at least one column of text is required to set the graphics attributes for the line (set by placing a byte value 145-151 in column 0 of the line).

Plotting pixels in the teletext mode is not as easy as in the graphics modes, because the only way to set a particular pixel is to replot the code for the entire character including or excluding the particular pixel.

To calculate the Ascii code for a given block of six pixels, the grid below is used.

1	2
4	8
16	64

Calculating the Ascii code

Take the values from the grid only for the pixels which are set, and sum these. Then add 160 to the total, and the result is the Ascii code needed to generate the pixels.

Martin's program does this for each pixel in the character definition. An 8x8 character is generated as three rows each consisting of four characters.

Each character is then individually plotted by the machine code routine, and the appropriate cursor control codes move the cursor on to the correct position so that it can print the next one.



To use the program, incorporate the two procedures OSWORD &0A and PROCprint into your own program, and then at the point you wish to print a large text message in mode 7, issue a PROCprint call.

The procedure takes two parameters, the string to be printed, and a number between 1 (red) and 7 (white) for the colour to be used.

These are the normal teletext colour numbers. Horizontal positioning can be done by first moving the cursor to a given position with PROCprint or more simply, by inserting spaces in front of the text to be printed.

Note that due to the large size of the text, only nine or less characters can be included in the printed string, even when starting from the left of the screen. If your text starts further in, then the number of characters is further reduced.

A ready set-up program, with demonstration text, is included in the yellow pages, and on the monthly disc.

An interesting consequence of the OSWORD &0A method of generating characters is that the routine works perfectly well with user-defined characters, correctly displaying either special characters above Ascii code 128, or even a completely redefined main character set.

This gives rise to a number of interesting possibilities. If you have redefined, say, character 128, to produce a box shape with

```
VDU 23,128,&FF,&81,&81,&81,
&81,&81,&81,&FF
```

then you can display, say, a row of boxes in mode 7 with

```
PROCprint(STRING$(9,(CHR
$128)).
```

£10 CUT & PASTE REVISITED

Alan Meban of Lisburn in Northern Ireland has produced some enhancements to Brian Ross's Cut and Paste Rom which was featured in the March 1989 Hints and Tips column, and again in the Hints and Tips Special in the August 1990 issue of *BAU*.

These improve the original program to allow preservation of the 'cut' text through a reset and 'pasting' the text to a printer.

It is often useful to make a copy of part of the screen from the application in which you are working.

However, the only way to leave some programs is by pressing BREAK.

This resets the computer and also resets the Cut and Paste Rom, making it very difficult to retrieve the stored text.

To overcome this problem, Alan advises that lines 240, 1000 and 1010 (August Special) or 230, 990 and 1000 (original March 1989 article) should be deleted from the listing.

Here at last...

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Another quality peripheral designed & manufactured by...



...who else?

Available from all good dealers or direct from Morley Electronics (please see our other advertisement in this issue)

By doing this you prevent the variable cflag being set to zero on a reset (you also stop the checksum).

The second alteration that can be made to the Cut and Paste Rom image is to output the stored text to the printer instead of the keyboard buffer.

By selecting the whole screen, a screen dump can be made, similar to the PrtSc function of IBM PCs (also implemented on BBCs in this column a couple of years ago).

However, partial screen dumps can also be printed.

The necessary changes are as follows:

```
240 :
4770 LDX #&FC
4800 BEQ endpas
4912 LDA #10
4915 JSR ikb
5205 PHA
5210 LDA #3
5215 LDA #10
5220 JSR osbyte
5235 LDA #3
5240 LDX #0
5245 JMP osbyte
```

The line numbers replace those in the August Special. However, if you are working with the original article, simply subtract 10 from each line number, for example the LDX #&FC command should have a line number of 4760.

In the following paragraphs, all the line numbers are from the August Special, with the line numbers from the original following these in brackets.

The subroutine ikb in the original listing, beginning at line 5200 (5190), places the character contained in the accumulator into the keyboard buffer using the OSBYTE &8A system call. By changing this routine, the character can be output to the printer instead.

The new ikb routine changes the output stream to the printer, disabling the screen. It prints the character, and then resets the output stream to the screen.

Several other changes must now be made. When the paste polling routine is being set up, the printer is enabled. The printer is disabled when the printing is all over.

At the beginning of the vector subroutine, line 4740 (4730) onwards, the original program tests to see if the keyboard buffer is empty.

If so, another character is entered. In this revised version, the printer buffer is tested and as long as it is not full, another character is printed.

When using a network printer for output, it is important to note that VDU 2 not only lets your station use the printer, but it also ejects a page to clear other stations' uncollected printouts. Because of this, the ikb routine cannot turn the printer on using VDU 2, print one character using VDU 1,char and then turn the printer off using VDU 3.

Doing this would be perfectly all right on most printers, but on a network would generate a new sheet of paper for each character!

To overcome this, the assembly language equivalent of *FX3,10 turns on output to the printer for each character, and *FX3,0 resets the output stream to the screen only.

These two modifications can be combined. You can implement either one or both. Simply load in the original listing – obviously do not renumber it – and type in the alterations, using the correct range of line numbers depending upon whether your original is from the March 1989 or August 1990 edition of the magazine.

Note that the Rom will work with the Master series or the Electron but not the BBC model B or B+ as these do not support the Rom polling routines, one of the few ways in which an Electron is superior to the model B machine!

To use the routines, follow the instructions in the original articles. The difference is that when you press BREAK any text in the 'cut' buffer is not lost, and can still be pasted.

When you perform the paste operation the pasting will result in a printout rather than screen output.

You should of course keep an original copy of the program to allow screen pasting as well, but you will only be able to work with one at once.

£5 EXTENDED DUMP

Another tip from **Alan Merban** concerns the use of the *DUMP command.

Many BBC B+, Master and Compact owners, and BBC and Electron owners with a 1770 DFS will not have realised the full potential of this command, which on the 1770 DFS is extended to offer a very versatile facility.

The extended syntax of the DUMP command is:

```
*DUMP filename start offset
```

The first parameter is the filename. The next parameter, start is where in the file the computer starts to dump from. For example:

```
*DUMP file 100
```

would start dumping file on the 256th (&100) byte. The last parameter, offset, is perhaps the most useful. It allows you to set the address the computer will start counting from.

This value is added onto the position in the file. If a machine code program with a load address of &900 was being dumped, then

```
*DUMP code 0 900
```

would dump all of it, beginning to count at &900, therefore giving the correct memory locations. Note that if either of the two parameters are omitted, they default to zero.

£5 TYPE IDENTIFIER

Regular contributor **Andrew Pepperell** from Louth has written a useful little program which quickly identifies whether a file on disc is Basic, program data, Rom image or machine code. To use the program, type in the yellow pages listing and run it. This creates a machine code program called *Ident* on the disc.

Once this has been created, type *IDENT filename and the program will print on the screen what type of file filename is.

This can be used to quickly identify files, especially when you are not in Basic and there is no easy way, without loading the file, to know what it is.

The filename follows all normal filename rules for programs, you can include the filing system (Masters only), drive number and full pathname if you wish. Note that wildcards are not supported.

The program works by reading from the disc catalogue the execution address of the file, and isolating the least significant 16 bits of this address.

This is then compared with the data stored at the label .table, which is a table of execution addresses known to be appropriate to certain types of data.

The addresses &801B, &8023 and &802B are decoded as Basic, addresses &0000 and &FFFF are assumed to be program data, address &8000 is taken to be a Rom image and anything else is deemed to be machine code.

You can add further items to this table, delete items, or alter their names.

To add further information, adjust the variable checks which indicates the number of checks to be made (and the length of the table).

Then, for each execution address, add to the table the address value you are looking for, and the address of the text to be displayed when this value is found.

Note that it is the address of the text, not the text itself which is inserted at this point.

For example, if you decided that all files with an execution address of &0900 were called 'Utility', then you would add to the end of the table two lines as follows:

```
EQUW &900
EQUW utility
```

and then after the end of the program (but within the assembly), the lines

```
.utility
EQUS "Utility"
EQUB 0
```

in other words, the text string you wish to display, terminated

by a zero.

You could also expand this program to deal with wildcards. This would involve using SGBPB with A=8 to read each directory entry.

£5 AUTO SAVE BASIC

Another interesting utility from **Andrew Pepperell** is a program to save Basic programs using a filename provided in the first line of the program, in a similar manner to the automatic filename feature provided in Archimedes BBC Basic.

To use this program, type in or load the yellow pages listing and run it. A machine code program called *QSave* will be produced.

Keep this file on the disc where you are developing your Basic programs, and include in your program the line REM filename where filename is a legal Basic filename in the current filing system.

This can include a full pathname if you wish. This line must be the first line in the program. When you want to save the program, type *QSAVE.

No other parameters are needed, and the program will be saved under the filename given in the REM statement in the first line.

Note that when typing in the program, the variable norm$ should be set to the normal value of PAGE in your system.

The program works by reading the current values of PAGE and TOP, and the filename from the REM statement, converting the values to hexadecimal strings and building up a *SAVE string, which is then called with OSCLI to save the program.

If the first line is not in the correct form, the program detects this, and the error 'Check first line' occurs.

You may find it useful when using the program to reduce the name of the *QSave* file to the shortest possible name, ie simply call it S. Then, when working you only have to type *S to save the program.

It is good practice to keep saving your program when working, especially if developing machine code, for two reasons in particular.

Firstly, although BREAK and OLD will get you out of most problems, it doesn't help if you are performing direct memory access and accidentally overwrite the main program area.

Secondly when you want to try something which you are not totally sure of, like deleting a large section of the program, the most convenient way to work is to save where you're up to, perform the experimental modifications, and then if the experiment fails you can simply reload the original.

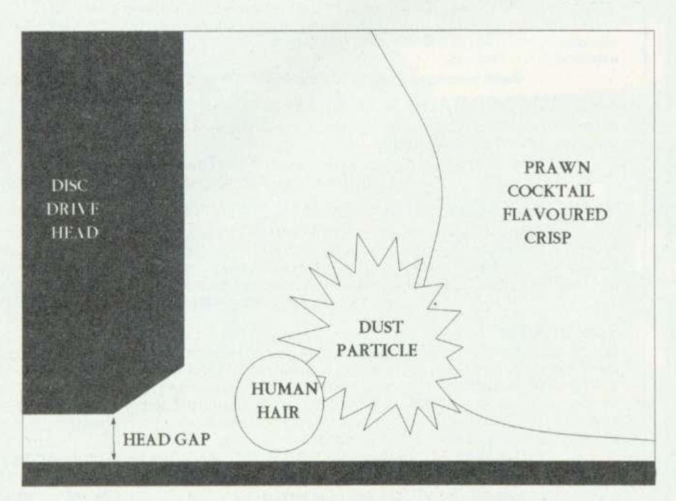
£5 FAULTY DISC

A quick tip from 12-year old **Greg Williams** of Letchworth concerning faulty discs, and very useful for those watching the pennies!

When you format a disc under DFS and get the dreaded 'Disc fault 18' it is quite often that the fault occurs after the first 40 tracks (ie the track number in the fault message is higher than 27 (39 decimal).

The track number is the number that comes before the '/' in the message, and is given in hexadecimal.

If this is the case, you still make use of the disc. Place the



faulty disc in an 80-track drive, but use the 40-track formatting command which will either be *FORM 40 0, or *FORM40 or similar depending on which DFS and formatter you are using.

The first 40 tracks of the 80 will format, and the catalogue details, etc, will be written for a 40-track disc, although physically, the tracks are laid out at 80-track density.

This disc will then work perfectly as a 40-track disc, you can even *BACKUP a normal 40-track disc to it if your other drive is switchable to 40 tracks. It must of course always run in an 80-track drive.

Some formatters have the ability to format even less tracks, meaning that you can type *FORM 10 0 or *FORM 17 0 and so on.

If you have one of these, you can also make use of discs where the error occurs even earlier on the disc.

These 'small capacity' discs are useful when you are sending files on disc to other people, and the thing you are sending is only a few kilobytes long.

These tips generally don't hold for ADFS, although on this system, an analogous tip is: When confronted with a disc which errors on the second side, ie after track 80, reformat it using the little used M format (single-sided 80 tracks) or even the S format (single-sided 40 tracks).

Like the DFS method, formatting with the S format works fine on an 80-track drive – you don't have to switch to 40 tracks. It will therefore also work with 3.5in discs.

If you have any hints or tips for the eight-bit range of Acorn machines, please send them, in the usual form, to David Atherton, Eight Bits, BBC Acorn User, *20-26 Brunswick Place, London N1 6DJ. As always, items on using applications (word-processing, databases, music, printers) are preferred, and technical utilities should do something useful rather than be simply clever programming demonstrations.*

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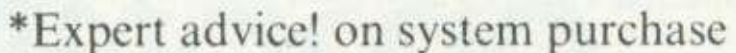
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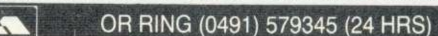
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THE NEXT

Is CD-Rom where the future lies? **MALCOLM BROWN** explores the phenomenon and tries out Next Technology's option for the A3000 and Arc

The CD-Rom has arrived for the BBC A3000. This is almost the first admission by Acorn of an existing industry standard so, before looking at the Acorn version, let's look at the technology itself.

A few years back when micros with 1Mb or more of Ram became commonplace, relying on a floppy disc drive requiring a handful of discs and several minutes to fill the memory seemed a little silly.

Magnetic media was reaching its technological limit (there's a future for it again now, but that's another story) and optical storage was seen as the way forward. The first moves in that direction had been made by Philips back in 1967 and by 1986, mass production of an efficient form of optical storage was then coming into its own – audio CDs.

It was a small step to extend the sampled sound data of CDs to pure digital data for computers.

CD-Roms use a spiral track of tiny pits less than 1mm wide, in the surface of a 12cm disc, to modulate a reflected laser beam shining onto its revolving surface.

Next Technology's CD-Rom player

A photodetector registers changes in the reflected light level as the pits spin past. Each change of light level (the leading or trailing edge of a pit) represents a binary 1 and the flat areas ('lands') in between represent zeros. The disc spins faster when the centre is being read (about 500rpm) than the outer tracks (around 200rpm) which keeps a constant speed (about 1.3m/s) past the read head. Useful data comes off the disc at a rate of 153.6Kb/s.

The data is encoded to reduce the effects of reading errors, from scratches on the disc or system glitches, and for identification to enable accurate random access. As a hangover from its audio CD roots, CD-Rom is addressed in units of 'playing time'.

The data emerges from the pickup as a serial bitstream. These bits are dealt with in lots of 588. First, 27 bits of synchronisation data are stripped off. Of the remaining, 297 bits are then removed in a condensation process called 'Eight to Fourteen Modulation' (EFM). Since large long runs of zeros (flat areas) would cause the read head to wander, data is stored on the disc as 14-bit bytes with only the 'best' binary combinations used and a further three bits are used to clearly separate each byte. The 33 17-bit words are condensed with EFM to 33 conventional eight-bit bytes.

One byte is a sub code byte containing positional information and this is sent to a special decoder. Of the other 32, eight are CIRC error correction code bytes. The remaining 24 bytes form the useful data 'frame'.

So far, CD-Rom is much like CD-Audio. However, there is more synchronisation and error detection to go for CD-Rom.

The 24-byte frames are gathered up in 'sectors' of 98 – 2352-byte chunks. Twelve bytes form more synchronisation data, four bytes make up the header information (minutes, seconds and sector number), 2048 bytes are the final data and a massive 288 bytes form the complex error detection and correction data.

Each 12cm CD-Rom disc can hold 276,480 sectors, or a massive 540Mb.

The system can sucessfully correct error bursts of up to 450 bytes long (which would

GENER

be a clearly visible mark). Combined with the additional error correction at block level (not found on audio CDs) CD-Roms have a rate of uncorrectable errors of just one in 10,000,000,000,000 – about one in every two years of constant access.

This kind of reliability has meant the CD-Rom is now taken seriously as a data storage media.

CD-Rom has already gained popularity in the IBM PC and Macintosh world (there are about 200,000 CD-Rom users worldwide) and a great many CD-Rom volumes have been published – everything from a single CD-Rom providing a dictionary, thesaurus, style manual and seven other reference works for writers, to the complete 18,500 page maintenance manual for a Boeing 757.

All the Sherlock Holmes stories are available, innumerable programmer's libraries, book and record catalogues, and even details on every country in the world called *The CIA Factbook*!

	Hard disc	Floppy disc	CD-Rom
Media cost (US$)	n/a	1-5	5-15
Drive cost (US$)	500-3000	200-1500	500-2500
Capacity (Mb)	5-50	0.36-1.20	550-680
Media size (cm)	13.34	13.34	12
Access time (ms)	30-300	30-50	400-1000
Data density (bits/in)	15000	10000	35000

Comparison of computer mass storage

The Next Technology CD-Rom drive for the BBC A3000 couldn't be simpler to fit and use. It is supplied complete with a standard SCSI interface which plugs into the expansion slot inside the A3000 with a flying cable to the CD-Rom drive itself. This is a small box looking for all the world like an external floppy drive. The disc is placed in a special carrier box (a bit like a CD-Audio case) and this is slotted into the front of the drive.

All the software to operate the machine is provided as a Risc OS filing system extension with a neat little CD-Rom disc icon on the icon bar.

This is treated just like a floppy or hard disc filing system and discs can be catalogued and files read as though from a conventional ADFS drive.

Of course, you can't alter information on the disc, nor save new data (that's the Rom bit of CD-Rom) but other tricks are provided. Audio discs or the audio tracks of mixed format discs can be played through headphones which plug into the drive box. Tracks can be selected, played, stopped and so on, all under the mouse control of a *!Cdplayer* application.

The first thing to notice is that the system is not terribly fast – much slower than a hard disc. This isn't because data is slow coming off the disc but because CD-Roms are inherently slow to access. Reconfiguring the data buffer to 512K or so speeds up the process but loading, say, screen pictures is still noticeably slow.

The sample disc has a good many files to play with. Apart from a complete set of all the Acorn software which accompanies your micro, there is also an enormous number of example screens, programs, music and clip-art from a variety of Acorn associated companies.

Here is the main problem with the system. Although the Risc OS extension reads the standard CD-Rom format without difficulty, it does not implement all the standard searches and database manipulation tools found in the MS Dos CD-Rom extension nor, of course, can you run the specialised MS Dos programs found on so many commercial CD-Roms.

This means the actual range of material usefully open to Acorn CD-Rom users is decidely limited.

Next sees the system as a resource – an open invitation to Arc users to create their own data which Next will put onto CD-Rom for about £300 a time. There is already talk of issuing large databases such as Neris in this format.

At the moment there is little incentive for home users to invest in a CD-Rom system. There are no megagames available (and there probably never will be for the Arc) and even standard reference works take a lot of home programming to make much use of.

For institutions, particularly schools, there is more sense in the purchase.

It's a gamble but the more schools that use this format, the more data packages that make the most of the tremendous potential of the CD-Rom medium will appear on the market.

The BBC A3000 CD-Rom drive, SCSI interface and sample disc cost £995 from Next Technology, St John's Innovation Centre, Cambridge CB4 4WS. Tel: (0223) 420222.

ATION

HATCHING THE PLOT

DAVID JANDA examines the HPGL plotter control language

One of the most versatile devices for hard copy output must be an X/Y plotter. It's fascinating to watch a plotter at work; buzzing and whirring away. Slow but sure, the end result is a plot with straight lines and smooth curves.

Besides the fascination, other reasons for using a plotter include colour and accuracy. A variety of pen colours with varying thicknesses are available which can be used on a wide range of media.

But by far the most impressive reason for using a plotter is accuracy – the vast majority of plotters on the market have a mechanical resolution of 0.0025cm. This accuracy is realised when you look at a plot which contains diagonal lines and curves. Although the plotter draws in small steps, you have to look hard to see any jagged edges.

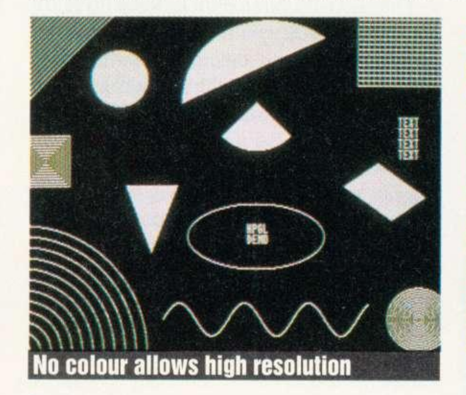
Alas, the same cannot be said for computers, where resolution is often sacrificed in favour of colour. The Acorn range of machines offer a number of graphic modes which allow the user to trade off between colour and resolution. Even so, a high resolution screen image with multiple colours is not possible, and on the standard model B the best trade off you can get is mode 1, where there are four colours with a resolution of 320x256.

Acorn machines do have a major plus point when it comes to graphics – VDU drivers. Whenever you draw a graphic, or print some text on screen, the computer generates an appropriate VDU code, which is sent to the VDU driver in the Mos. These codes (zero to 31) can be redirected by means of the SPOOL command, which in turn can send output to a variety of filing systems, such as disc or Econet.

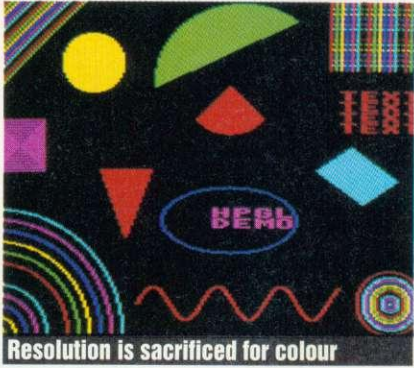
As an example, consider VDU 1 which is the code to send a character to a printer. If it were redirected to disc, and a dump of the file was displayed on screen it would look like:

```
&01 &xx
```

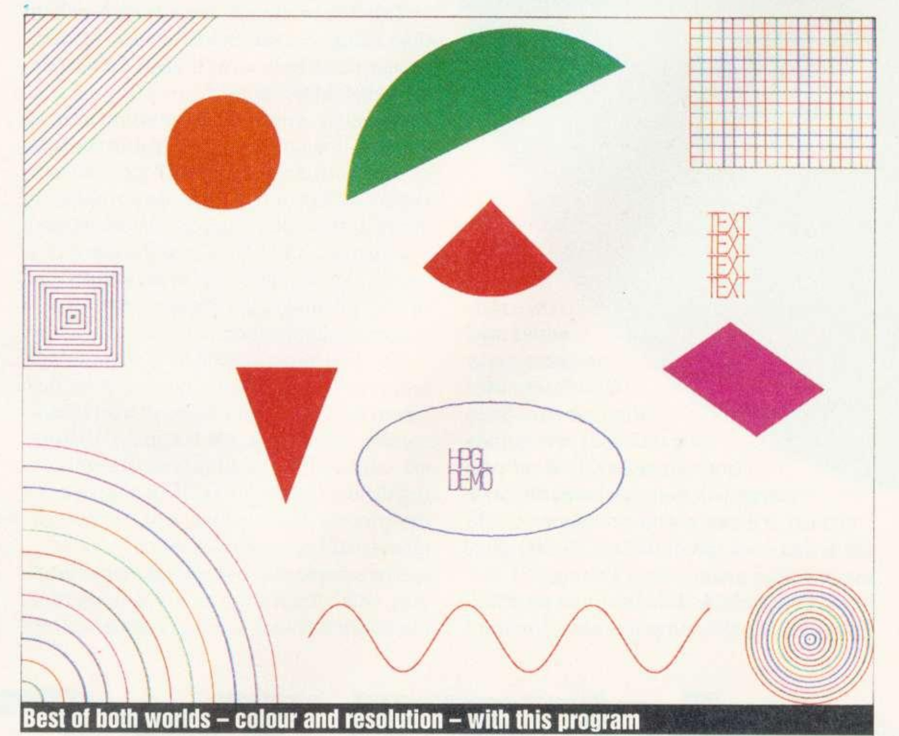
where xx is the Ascii code corresponding to the character to be sent to the printer.



No colour allows high resolution



Resolution is sacrificed for colour



Best of both worlds – colour and resolution – with this program

The VDU codes &00 to &1F and &7F perform a variety of operations, and can be followed by zero to nine one-byte parameters. The functions performed by the codes vary from turning on the printer, to re-defining characters. Of particular interest is VDU &19. This is followed by three parameters – the first being its function, and the other two a pair of co-ordinates.

It should be stressed that the VDU system is completely compatible across the entire Acorn range. This adds a great deal of flexibility to the machines, and allows programmers to use a standard set of commands that work, regardless of the programming language being used.

A similar situation exists with plotters.

Hewlett Packard produced some of the earliest plotters, and, in the 1970s, defined a control language for plotters that soon became the de-facto standard – Hewlett Packard Graphics Language (HPGL). Of course there are other plotter control languages, but the majority of plotter manufacturers include HPGL as part of their plotters' command set.

HPGL consists of 56 commands which control pen movement, scaling and shape drawing. The commands are sent to the plotter in Ascii form, and are easy to understand. Take the following Acorn/HPGL example:

```
10 GCOL 0,0
20 MOVE 0,0
30 DRAW 100,100
SP1; PA0,0; PD; PA100,100;
```

As you can see, HPGL commands are terminated with a semi-colon. Also notice that even though logical colour 0 was selected in Basic, pen 1 was chosen in the HPGL example because pen holders are numbered from 1 upwards, with pen 0 having the function of form-feed.

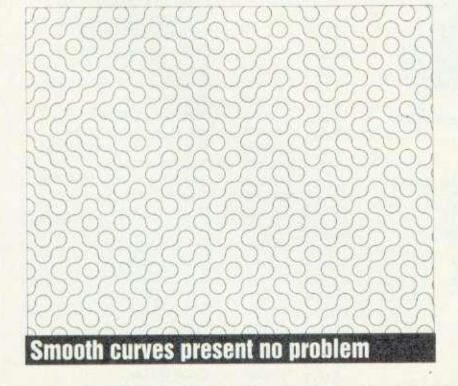
The program

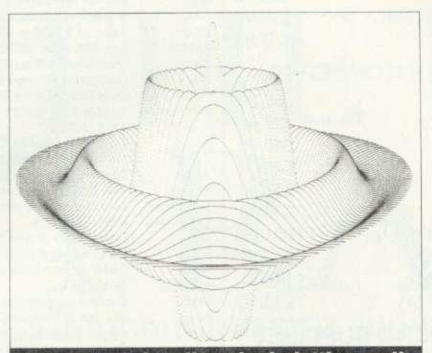
The HPGL translator is a data-driven program which takes VDU codes and converts them into equivalent HPGL commands. The benefits of using the HPGL translator over a printer include:

- Rendering most Acorn graphic commands to any HPGL compatible plotter
- Plotting in multiple colours
- True 1280 by 1024 plottable points
- Extremely high resolution drawing with 0.0025cm accuracy
- Multiple size plots 3.2cm x 2.56 to 64 x 51.2cm

Even if you don't have a plotter attached to your Acorn machine you are still in luck, as a *SPOOL option is included which will dump the HPGL commands into an Ascii file. The file can then be transferred to a system which has a plotter, where it's a simple matter of dumping the file to the plotter, thus producing the plot.

There are some limitations. First, GCOL options. Even the collective intelligence of *BBC Acorn User* cannot find a way of making wet ink flash or inverse, so you can only plot in the graphic foreground and background colours.


Smooth curves present no problem


The program handles pixel plotting well

Text printing is limited to printable text at graphics cursor (VDU 5). No control codes such as backspace or carriage return are supported, so it's imperative that you ensure that text printed at the graphics cursor does not wander outside the graphics window. Should this happen the plotter will be in 'lost mode'.

The only way to recover from this state is to perform an absolute plot within the currently defined graphic window.

A final point relating to printing text at the graphic cursor. In your program ensure that the graphic cursor is 'held' with a semicolon like this:

```
PRINT "BBC Acorn User";
```

Using the program

It's important to note that the HPGL translator does not perform a graphics dump. Instead it translates VDU codes into equivalent HPGL commands.

Preparing an existing program for plotting is easy. Simply insert a *SPOOLfilename prior to any graphic operations and a closing *SPOOL at the end. Run the translator, answer the setup questions and away it goes. The program will display the converted commands on screen, and the plotter will go about its business.

There are, however, three very important things to take note of. First, resolution. You now have 1280x1024 individual points which can be plotted in colour. So, prior to running the translator, run your program in mode 2 to see what colours will be displayed, and then run it again in mode 0 to see what type of resolution you will get. Please note that if your program displays points across an axis in steps greater than one you will notice gaps in the final plot.

Secondly, shape filling. All Acorn plot commands that fill shapes have an equivalent in the translator. Beware, the larger the shape to be filled the longer it will take. This applies to graphic windows which are filled in with the currently selected background colour.

Should you clear the default graphics window then the translator will fill in the entire area – you have been warned!

Thirdly, graphic windows in general. Just as your Acorn machine supports clipping of shapes when they go offscreen, so does the translator. This is achieved by setting up a HPGL graphic window around the entire 'screen area'.

However, if you re-define a smaller graphics window and then draw outside the physical boundaries of your screen, the plotter will plot the part of the graphic that falls outside the screen boundary. You also run the risk of entering 'lost mode'

Pens 'n' paper

Unlike conventional printer paper, you are not restricted to using white. Different coloured paper can be used to good effect.

The same applies to plotter pens. They come in a variety of colours (except white), and a range of thicknesses.

When using the translator, be sure to enter the correct velocity corresponding to the pen type, as damage to pen tips is possible if too high a velocity is chosen. The pen thickness is also important, as it informs the plotter how many steps it needs to fill a shape.

How it works

VDU information is read into the translator one byte at a time, and a sieve within the program separates the various VDU codes, and assigns their parameters to them. An appropriate procedure is then called. VDU codes not implemented simply fall out of the sieve. A second sieve (called from the first) sorts out individual PLOT &x commands. A colour (when necessary) is assigned and a procedure is called to draw that shape, move or whatever.

The drawing is done in one of two ways. First, a compatible HPGL command is found to perform the PLOT function – rectangles are fully supported in HPGL, and need no interpretation. Secondly, a group of HPGL commands are used to make up a shape. This is the case with triangles, which are not supported in HPGL. The same applies to colour filling. HPGL fills circles, rectangles, and segments. Sectors, triangles, ellipses and parallelograms rely on fill routines within the translator.

One particular routine, PROCarccalc, is worth using in your own programs. Given centre, start and end co-ordinates it will return the start and end angle (in degrees from the horizon) as well as the number of degrees turned.

Regarding the user fill routines. These are not as good as the HPGL fills, if you are not satisfied with the results you can always substitute your own.

I would like to thank Roland Digital and Hewlett Packard for their assistance with this article. I would also like to thank Chris Clarke and Graham Bell for the ARCcalc and Ellipse routines.

Archimedes

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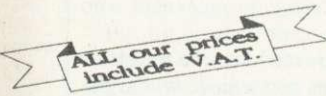
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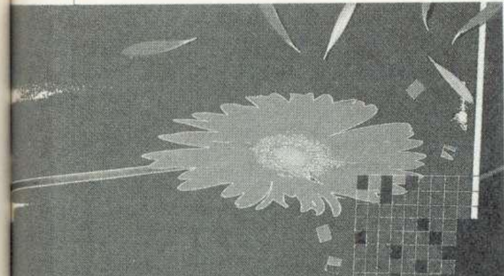
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THE LAST TRACES

Last month DAVID KNELL showed how ray-tracers work and how objects' surfaces are modelled by computer. This month he looks at a real ray-tracer, QRT

Quick Ray Tracing comes as a Risc OS application (*!QRT*). Double-clicking on the *!QRT* application puts up the window shown in figure 1. This allows you to control the operation of *QRT*. You can select the type of image file produced (RAW, a 24-bpp colour image or IMG, a sprite file), whether a stats file (giving statistics about the ray-tracing) is produced or not, whether or not objects will cast shadows (selecting 'No shadows' speeds ray-tracing up), the screen mode of the output image and how much of the screen the image should occupy (smaller images come out faster.) Once the options have been selected, a directory containing a *QRT* source file should be dragged to the window. Clicking on the 'start' button will start ray-tracing; it can be suspended or aborted once begun. *QRT* will ray-trace the image and it multi-tasks, which is good as it may take several hours to ray-trace a full-size image.

When *QRT* finishes ray-tracing, the directory containing the source file will have grown the image files asked for – a sprite file and/or a raw image file. The raw image file can be converted to a sprite using *ChangeFSI*, and you may get better results this way.

A simple QRT program

Figure 2 shows a simple *QRT* program with the output it generates – one of the spheres from last month. Let's look at it in detail.

The first line is a comment. Comment text may be placed in *QRT* programs, delimited by { and }. The next line gives the filename for the output image – this appears to be ignored by the Risc OS version (*QRT* was originally written for Atari STs.)

The next block of the program defines the position of the observer (that's where the 'eye' which looks at the image is situated), which direction the observer's looking in and which way is up. All three of these are defined in (x, y, z) co-ordinates. There must be an observer in the scene!

Fig 1. QRT control window

The SPHERE block defines the object that's in the scene. There are a number of different object types which *QRT* knows about; the rest will be examined later. The first two entries (loc and radius) define the location of the centre of the sphere (again, in (x, y, z) co-ordinates) and its radius in those units. The next two entries define the nature of the surface of the sphere. They each define a colour in terms of red, green or blue; each of these should be between 0 and 1. The first one, amb, defines the ambient light falling on the sphere, (0.2, 0.2, 0.2) giving fairly dim white light. The second, diff, defines the diffuse reflection of the sphere in terms of the amount of red, green and blue which its surface reflects. Put another way, it defines the colour of the sphere (0.1, 0.6, 0.1) and gives a surface which reflects mostly green light, so you end up with a green sphere.

The final object in this scene is a LAMP. LAMPs provide directed illumination of a scene, just like lamps in real life. The location of the lamp must be specified, as must the radius of the light source (which isn't used in the current version of *QRT*.) The dist parameter specifies the distance from the LAMP at which the light is at the intensity specified in the amb entry; beyond this distance the light level will fall off. Objects closer to the LAMP will be illuminated in brighter light than specified; this may well cause them to appear washed-out. Set dist to a bit less than the distance from the LAMP to the nearest object in the scene.

So that's a simple *QRT* program – to run it, create a directory with the name of the image to be produced, type the program in (using *!Edit* or similar) and save it into the directory with the filename *QRT*. Start the *QRT* application and drag the directory into its window, and it'll do the ray-tracing for you.

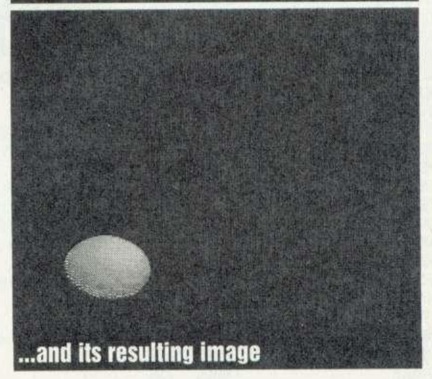
Now you know how to set simple surface attributes, but you'll remember from last month that there are a whole load of other types of surface to deal with (shiny, reflective and transparent.) *QRT* gives more surface specifiers than those for the sphere in the example above: see table 1 for details.

Real-life images are also composed of more than just spheres, and so *QRT* also provides more shapes than just the basic sphere – these are detailed in table 2.

You can generate more interesting images by using objects whose surfaces are patterned, rather than just being set to a uniform colour. *QRT* therefore lets you

```
{ Simple sphere 2 for QRT }
FILE_NAME = SSphere2.RAW
OBSERVER ( loc = (0, 0, 0),
       lookat = (100, 0, 0),
       up = (0, 200, 0)
   )
SPHERE ( loc = (100, 0, 0),
       radius = 50,
       amb = (0.2, 0.2, 0.2),
       diff = (0.1, 0.6, 0.1)
   )
LAMP ( loc = (-75, 75, 60),
       amb = (1.0, 1.0, 1.0),
       radius = 10,
       dist = 100
   )
```

Fig 2. A simple QRT program...



...and its resulting image



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define patterns and attach them to objects, which then sets the surface attributes of the object according to the pattern rather than to simple parameters given on an object-by-object basis. The pattern is given a name; this name is used to attach a pattern to an object, using another surface specifier, pattern = name, where name is the name of the pattern you want to attach to the object.

Patterns are defined using the PATTERN command. The definition following this command describes a rectangular segment of pattern, which is then repeated indefinitely as required by *QRT*. For instance, if you define a pattern segment as being 20x10, and use it to cover a rectangle of size 200x100, the pattern will be repeated 10 times in each direction.

The pattern is defined by specifying the colour of the surface of the object for areas within the pattern. You can specify the shapes of these areas as Circles, Rectangles and Polygons.

It's not necessary to specify a colour for the whole of the pattern area; bits which aren't specified will show the colour of the underlying object. Table 3 gives the syntax for the PATTERN command.

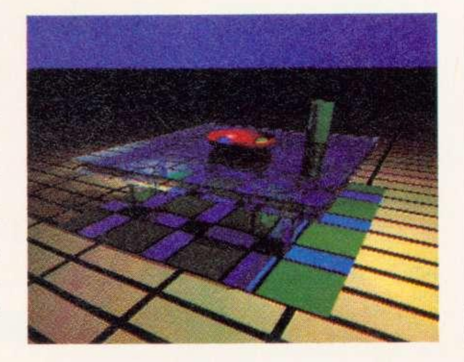
OK, so you can now define a scene consisting of a set of patterned objects and lights. There's a couple of other effects which would be nice – a way of specifying some sort of ground and one of specifying a sky colour. Well, you don't actually need a separate ground command – you can do it already. Just use a large parallelogram (and attach a colour to it if desired), or even, for the ultimate in realism, use a very large sphere. These can have patterns attached, of course, and so you can create all of the effects commonly seen in ray-tracers.

As for the sky, there's a separate SKY command, which defines a SKY object. It takes a couple of parameters: zenith = (R, G, B) and horiz = (R, G, B) which specify the colour of the sky at the horizon and directly overhead – those in between are calculated by interpolation between these two values.

These are all the basic tools available for building scenes for *QRT*. For building your own scenes, there's a couple of approaches – either start from scratch or modify one of the examples supplied with the program. If starting from scratch, it's a great help to make a rough sketch of your scene on paper first, to get an idea of where objects should be positioned.

When you come to ray-trace it at first, turn shadows off and select a small picture (1/16th or 1/64th of full size), as there's nothing worse than waiting six hours for a picture to be traced and finding that it's all come out black.

Copies of QRT with full source code in C plus examples can be had by taping a £1 coin to a formatted 3.5in 800K disc and sending it with an SAE to the author at 92 Ross Street, Cambridge CB1 3BU.



(R, G, B) Specifies a colour level all are between 0.0 and 1.0.
diff = (R, G, B) Specifies the diffuse reflection of the object (its colour).
amb = (R, G, B) Specifies the colour of ambient light falling on the object.
reflect = c (with 0.0 < c < 1.0) Specifies the percentage of light reflected by specular highlights.
sreflect = p Specifies the Phong coefficient for specular highlights.
mirror = (R, G, B) Specifies the mirror reflection of the object.
trans = (R, G, B) Specifies the amount of light transmitted through the surface of the object (used for transparent objects).
index = ri Sets the refractive index of the object.
density = (R, G, B) Sets the rate at which light is attenuated as it passes through the object.
dither = d Controls the amount of colour mixing used on the surface.

Table 1. The QRT surface specifiers

SPHERE (
loc = (x, y, z) Location of centre of sphere.
radius = r Radius of sphere.)
PARALLELOGRAM (
loc = (x, y, z) Location of one corner of parallelogram.
v1 = (x, y, z) Vectors defining the directions and lengths
v2 = (x, y, z) of two sides of parallelogram.)
TRIANGLE (
loc = (x, y, z) Location of one corner of triangle.
v1 = (x, y, z) Vectors defining the directions and lengths
v2 = (x, y, z) of two sides of the triangle.)
RING (
loc = (x, y, z) Location of the centre of ring.
v1 = (x, y, z) vectors defining plane in which the
v2 = (x, y, z) ring lies.
rad_1 = r1 Radius of inner circle.
rad_2 = r2 Radius of outer circle.)

Table 2. Shapes available in QRT

The PATTERN command takes three parameters giving its x- and y-sizes and giving it a name, followed by a set of CIRCLEs, RECTANGLEs and POLYGONs describing the pattern itself.
PATTERN (
name = name,
x_size = xs,
y_size = ys,
followed by a set of pattern definitions:
CIRCLE (
radius = r
The circle is specified by radius; its centre is at (0,0) in the pattern definition.
followed by: surface definition parameters - see Table 1.)
RECTANGLE (
start_x = x1, Defines two diagonally opposite corners
start_y = y1, of the rectangle.
end_x = x2,
end_y = y2,
follwed by: surface definition parameters.)
POLYGON (
point = (x, y) Defines a point on the polygon. There must be at least four points, with the first the same as the last.
followed by: surface definition parameters.)

Table 3. Syntax for PATTERN command

DRAWING LOTS

Rather than buy a graphics package for his Electron, **JAMES RICHARDS** opted to go the do-it-yourself route

Picpac version 1

With the ever increasing amount of software out there, it's getting harder to choose the right package. When I wanted to buy a graphics package for my Electron I first waded through old copies of *BAU* scouring the adverts and reviews for a suitable candidate. Although reviews can be very helpful, computer graphics is an area of the market that is very personal. When you have bought the package you have to suffer its little niggles and bugs, changing the way you want to do things to the way your new purchase dictates. This can make using an art package a very frustrating experience and that is the exact opposite of what it is supposed to be.

This led me to thinking 'why not write my own software?' After all Acorn didn't build that nice language called BBC Basic into my machine for nothing. I wanted to write my own graphics package so that if I found something in it that annoyed me I could change it.

Over the next few issues, I will show how easy it is to write such a package using some simple techniques and how good results can be achieved with a little lateral thinking. The listings, although primarily designed on an Electron with a Plus 3 will work on a Compact, Master or Beeb with OS 1.2 with disc drive and ADFS. By the end of this first article, you will have a program that lets you draw lines on the screen. By the time the series is finished you will have a fully functioning graphics package with many useful utilities.

Before I began to write my package I first had to lay out all the constraints of my system and how to work around them. A graphics package should run in all available graphics modes. Why? Simply because each mode has its own use. Mode 2 has loads of colours but a low resolution, ideal for nice, cuddly graphics. Mode 0 has only two colours, black and white but a very high resolution making it ideal for detailed and technical drawings.

A full graphics package won't fit into an Electron's tiny memory, but I took advantage of the 300K of program storage space in my disc drive. This may be a bit slower than memory but it does the job.

Individual programs are needed for each utility. This means that functions such as line drawing and circle plotting are all handled by separate programs. So, if you want to adjust the line drawing routine, you simply load it, modify it and then save it. This modular approach makes adjusting the package very easy.

Subsequent articles will contain listings for a complete graphics package with lines, text, circles, curves and copying routines. These are a basic starting block for you to work on.

Eventually your package may mutate beyond recognition to suit your needs and that means my project will have been successful. You will want to change the programs and add your own. I hope you do – it's very satisfying when you have a package that you can say you have moulded with your own fingers and hard work.

The bones of Picpac

The first thing you need is a menu which allows you to specify which program you wish to use. It should CHAIN the program and when you have finished editing the screen (by pressing ESCAPE), you are returned to the menu to allow you to choose another option.

From the menu you can choose which mode you use – this can be either 0, 1, 2, 4 or 5. Most of the programs need to know what mode *Picpac* is currently operating in and the mode number is held in a variable called M%. M% is a global variable, the value of which can only be changed by you in the menu. It holds its value between programs as it is a resident variable – meaning that its value is only lost on a CTRL-BREAK. The same goes for the other 25 resident variables A% to Z%.

At its simplest the menu doesn't have to be more than one line to ask which mode you wish to edit in and another to ask which

program you wish to use to edit your screen. I'll just make it a little more complex, however, and add a few more utilities, including:

- A star command utility so that you can do things such as delete files and rename them
- A facility to save your screens and load them
- A printer dump
- A facility to save a part of your screen
- A gallery facility so that you can view the screens you have drawn

Finally you need some way to add your own programs to *Picpac* and then run them from the menu.

Screen editing facilities include :

- Rubber banding – a utility that allows you to draw lines on the screen
- Circles and curves – to allow you to draw circles, curves and arcs
- A copying routine – this allows you to move blocks of the screen around
- A text routine – which allows you to place text on the screen
- A fill routine – which lets you solid fill shapes

All these programs will be stored on disc in a directory called Picpac. Also each mode will have its own directory so that it is impossible to load a mode 2 screen into a mode 5 screen by accident. See figure 1 for a diagram of the directory structure of *Picpac*.

Up front

These days it's trendy to impersonate a Wimp interface on your less powerful computer so I see no reason why my menu program shouldn't make use of the concept. Each utility will be represented by an icon. Moving a pointer over your chosen icon and pressing RETURN will execute that utility. This sounds difficult to implement but in fact it is very easy to do.

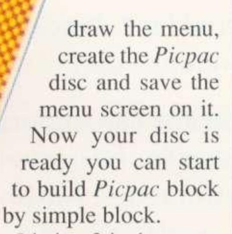
Every icon has four corners, each with its own co-ordinates. The pointer has its own co-ordinates as well. All the program has to do when you press RETURN is call a procedure that will check if the pointer's co-ordinates lie within the box bounded by the icon. If it does then another procedure is called to deal with the request.

Utilities such as star commands and loading and saving screens is handled by separate programs. For instance, when the user presses RETURN over the star command icon the menu program calls PROCstarcomm which simply consists of the line CHAIN"StarComm".

When you press ESCAPE from Starcomm it simply CHAINS "Menu", and similarly for the other functions in *Picpac*. Things are a little more complicated, however, for screen editing utilities. What *Picpac* needs to do when you choose a screen editing utility is to change the screen mode, load a file called 'Wkfile' from the current modes directory into the screen and then CHAIN the chosen utility. When you have finished, all you need to do is press ESCAPE and the screen will be saved as Wkfile and the menu will reappear.

To facilitate this, three separate programs are required, the menu, a program to load the workfile and run the utility and a program to save the screen and return to the menu.

First things first. Type in listing 1 and save it onto a blank disc as PageMak. It will draw the menu, create the *Picpac* disc and save the menu screen on it. Now your disc is ready you can start to build *Picpac* block by simple block.



Listing 2 is the menu program. It is mainly concerned with checking which icon you are working with when RETURN is pressed.

A couple of simple utilities are provided – a time keeper and of course the change mode facility. Enter listing 2 and save it as Menu in the Picpac directory. When you run this you will be able to move the pointer around the screen and click away to your heart's content although nothing will work yet of course.

You can now add a start-up utility to your *Picpac* disc by following these instructions:

- Build a boot file in the root directory by typing

```
*BUILD $.!boot
```

- Type the following lines:

```
0001 *Basic
0002 *Dir Picpac
0003 CHAIN"Init"
```

- Enter this short program

```
10 TIME=0
20 M%=0
30 *FX 15,0
40 key$=INKEY$(3)
50 IF key$="" THEN key$="0"
50 M%=EVAL(key$)
60 CHAIN"Menu"
```

Save the program as Init in the Picpac directory.

- If you now type *FX 4,3 this instructs your machine to execute the !Boot file when you press SHIFT/BREAK. You can now run *Picpac* by pressing SHIFT/BREAK, and by holding down the number key you can start in your chosen mode.

Before going any further, enter listings 3 and 4, save them in the Picpac directory as Icondrive and Bootstr respectively.

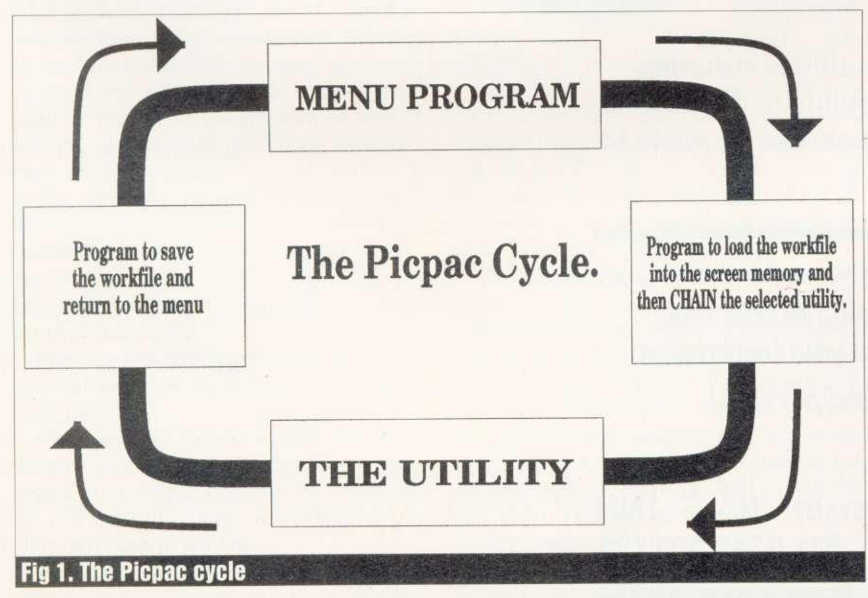


Fig 1. The Picpac cycle

RUBBER BAND

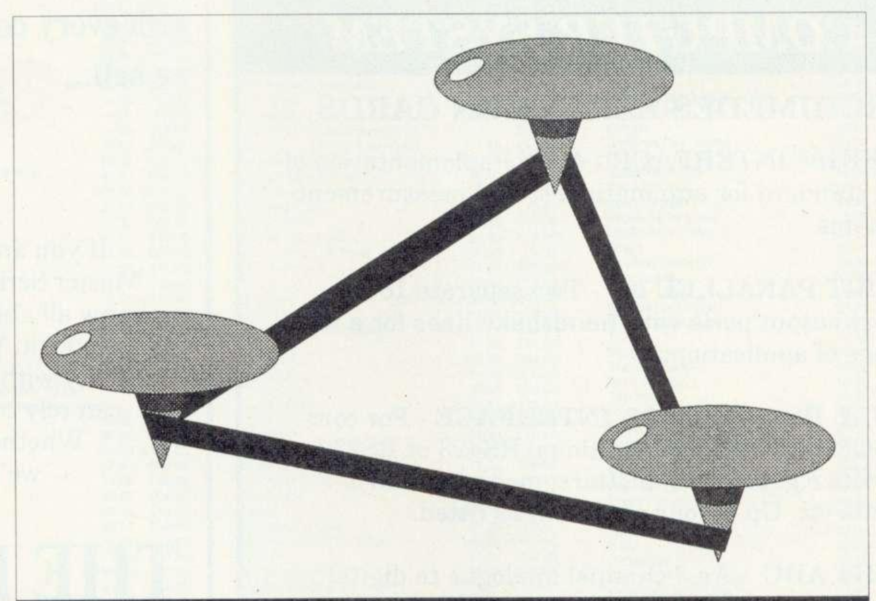
Draw lines with the rubber band

Listing 3, Icondrive, is the program that forms the link between the menu and the screen editing utility. It simply loads the workfile into the screen memory ready for editing and then CHAINs the selected program. It does this by CHAINing the string stored at address &900. This string is placed there by the menu program and is the filename of the utility.

Now you can edit the screen with your chosen utility and when you have finished press ESCAPE. The utility now CHAINS listing 4.

Listing 4 saves the edited screen as Wkfile in its modes directory and then simply CHAINs the menu so you can select another utility.

Of course it is pretty crucial that no errors occur in listing 4, since a disc error could result in the loss of hours of careful work. So if an error does occur you are asked to insert a new disc and a screensave called Emergency is saved onto it.


A demonstration of rubber banding

Rubber banding

Rubber banding is a well-established technique in computer graphics and forms the basis of *Picpac*. Although it is a simple technique it will allow you to draw some quite complex screens.

Take a pin and stick it in a board. Place a rubber band around this pin. Now place another pin in the board, join the two together with this band and you have a line. You can go on doing this with as many pins and bands as you like, eventually making up a picture. This is as complicated as rubber banding gets and it is just as easy to implement on the computer.

The first 'pin' is stuck in the centre of the screen. The second 'pin' has to be stuck in the screen by you. This is done by moving it around using the Z X/ and : keys. A line stretches out, representing the band between these pins.

Pressing RETURN fixes the line in the current colour, chosen by the left and right cursor keys.

Now you can stretch the line out from this new point, plotting lines until you have drawn your shape. Pressing M will move the line without plotting it and keys 1 to 4 alter the speed of the line.

The rubber banding module is listing 5 on the yellow pages. Save it as Band in the Picpac directory. You can now select rubber banding from the menu using the pencil icon.

Standards in the flesh

As with all packages, standards are important and extensive use is made of them in *Picpac*. They help everybody by decreasing the amount you need to learn. Universal keys such as movement keys remain the same in all *Picpac* utilities. The package also adheres to certain programming standards, as it is designed to be changed and modified.

I have already mentioned the standard direction keys, Z X / and :. These keys are used in all of the programs for movement of the cursor.

Most drawing utilities need to know a colour, especially rubber banding. The left and right cursor keys will be used for choosing colours. The current colour is shown in the bottom line of the graphics screen in all these functions (as are some simple messages from that function).

The ESCAPE key is used to exit all programs, except the menu.

In screen editing facilities a simple Undo facility is catered for. If you are about to perform a major change to the screen and you are not sure whether you like it or not you can save the current screen by pressing O. Then you can make the change, and if you don't like it, pressing I will load in the old screen, deleting the mistake.

Next month I will describe a few more enhancements to the package, that's if you haven't already written your own!

MENU KEYS

Z - Move pointer left
X - Move pointer right
: - Move pointer up
/ - Move pointer down
RETURN - Select icon

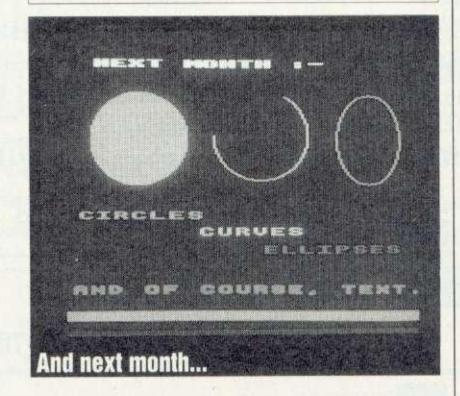
RUBBER BANDING KEYS

Z - Move end of line right
X - Move end of line left
: - Move end of line up
/ - Move end of line down
C - Clear entire screen
Left cursor - Decrement plotting colour
Right cursor - Increment plotting colour
ESCAPE - Exit banding and return to menu

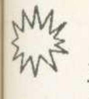
If you are about to perform a crucial operation press O.
If you are not then happy with the results press I to undo this last action.

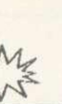
HOW TO SAVE EACH LISTING

Listing 1 – Pagemak
Listing 2 – Menu
Listing 3 – Icondrive
Listing 4 – Bootstr
Listing 5 – Band



And next month...





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BROKEN ENGLISH

CHRIS DRAGE, in the first in a series on IT in the National Curriculum, finds that some subjects are not being given the emphasis they deserve

When you read the English orders for the National Curriculum you could be forgiven for thinking that its authors were trapped in a time warp in and around 1982 and that computers in schools just hadn't got off the ground. The simple fact is that the use of IT in National Curriculum English is conspicuous by its absence.

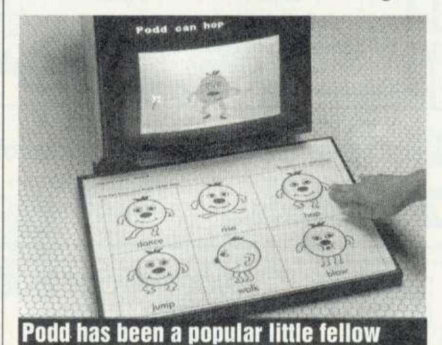
OK, that's probably overstating the case, but scant mention is given to electronic means of communication in the attainment targets or the programmes of study. Only the non-statutory guidelines offer any scope for implementing IT and even these appear rather reticent about the whole issue.

The English orders for the National Curriculum have five attainment targets:

- AT1 Speaking and listening
- AT2 Reading
- AT3 Writing
- AT4 Spelling
- AT4/5 Presentation

Reference is made mainly to the use of wordprocessors, spelling checkers and computer databases, although electronic mail gets a brief mention, once. With regard to DTP it suggests that 'pupils might use a desktop publisher and subsequently discuss the way in which communication is influenced by design and layout'.

The orders do recognise the importance of IT for children with special needs and there are footnotes to the effect that at each attainment level the use of 'technological aids' by pupils who depend on them physically is perfectly acceptable.



Podd has been a popular little fellow

The guidelines also state rather vaguely that 'IT can usefully help children' but there is no word of hypermedia, viewdata, simulations, adventure programs and so on.

All the evidence suggests that in the future there will be an even heavier emphasis on IT to facilitate effective communication. It seems only realistic to prepare children for this eventuality now.

Indeed, the technology orders recognise this fact. As a complete contrast, AT5 states that as early as key stage 1 children should 'organise and present ideas in a variety of forms using software packages'. In later key stages examples are provided of the types of IT children should encounter.

No aspect of the National Curriculum is finite so there is hope that a future evolution of the English orders will more accurately reflect the importance of IT.

This month I want to look at a wide range of recently published software, relevant for pupils at each key stage, which will enhance the delivery of various aspects of the English National Curriculum.

Incidentally, a number of these programs are equally valid for use at home where parents can usefully help their children by providing the opportunity to practice wordprocessing, DTP and develop language and computer skills.

● **AT1 Speaking and listening:** The most important contribution a computer makes to this attainment target takes place every time two or more youngsters gather round it, leading to discussion. Thus any computer-based activity which involves groups of children will provide valuable opportunities for talking and listening.

With older pupils a hypermedia-type program like *Genesis* from Software Solutions provides opportunities for computer-assisted presentations.

● **AT2 Reading:** Both HS Software and Sherston Software market packages which aim to boost reading skills. In the hands of a sensitive teacher, carefully designed, skills-based software can form part of the overall strategy in helping children with specific language difficulties.

Hyperbook from Longman Logotron offers a very powerful tool for the study of textual information and can be put to good use in secondary schools where, for example, *Macbeth* can be searched rapidly to locate and print out all the evidence showing Macbeth's violent personality.

Similarly, if the play is staged, each individual part can be printed out. A book on disc can be read sequentially, accessed randomly or via an index, or scanned for particular words or phrases.

● **AT3/AT4/AT5 Writing/Spelling/Presentation:** As wordprocessing is mentioned in the English orders, it seems a good place to start. Over the years a number of wordprocessors have evolved. Arguably the most important of these have been *Folio* (ESM) and *Pendown* (Longman Logotron), while for special needs *Prompt/Writer* (NCET) has enjoyed popularity. Each of these programs now has a more powerful, flexible Archimedes equivalent in *Archimedes Folio*, *Archimedes Pendown* and *Phases1* (from Northwest Semerc).

Of course a lot of schools will be using their BBC B/Master 128 versions for years to come, while some primaries and many secondaries will enjoy the considerable advantages offered by the new versions.

Archimedes Pendown is available in a pre-release form aimed at primary schools, but it is a high quality software tool. The secondary version (due in January 1991) will differ mainly in the contents of its dictionary and its documentation. The final version will include graphic images (sprites), a spellchecker and Concept Keyboard links.

What impresses me about the 32-bit version is that it is designed to be a sensible, functional tool (unlike the rather eccentric *First Word Plus*, for example). What children used to the original *Pendown* will really appreciate is the chance to display their chosen fonts in (almost) any size and to see the printed results closely resembling them.

Archimedes Pendown exemplifies the proclaimed advantages of 32-bit computing for schools: a smooth, consistent powerful writing environment which complements the National Curriculum.

Other Arc wordprocessors include *Phases1*, discussed in the September issue, plus *Archimedes Folio* (ESM) and *Classmate* (Clares Micro Supplies), neither of which were ready at the time of writing.

To introduce children to wordprocessing is always a headache, mainly because software tends to demand too much from the learner all at once. Recognising this, Northern Micromedia has, over the years, published a delightful series of programs which young children absolutely love. The titles include *Pip Goes To The Moon*, *All About Me* and, recently, *More About Me*




Quite simply, children are guided through choices in the production of an illustrated story which, at the end, can be printed out and stapled into a 'real book'. They love to colour in the printed, monochrome pictures and go over the text, highlighting it.

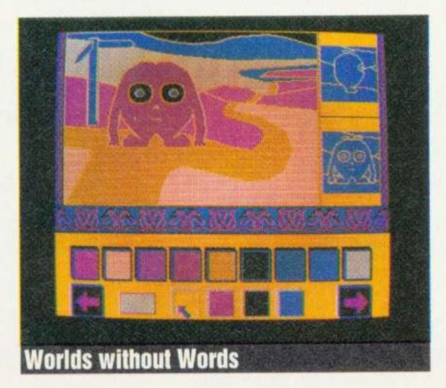
Other, similar, writing tools which are soundly designed and popular include the *Fairy Tales* series (Resource) and the programs *Ramayana Tales* and *Through The Dragon's Eye* (Longman Logotron) which complement the BBC's successful *Look and Read* TV broadcasts and are aimed at supporting seven to nine-year-olds whose reading lacks fluency.

The concept of combining graphic images (sprites) and pupil's text in a 'building block' fashion to produce illustrated stories, is brought to its logical conclusion in Resource's excellent *Archimedes Desktop Stories*. Again, the power of 32-bit technology provides a stunning environment which even the most reluctant of writers enjoy.

Desktop publishing is all about the presentation of the printed word (AT5). In the primary school *Folio* users have some DTP facilities in *Advanced Folio* while *Pendown* users can take advantage of the delightful *Printbox* (Longman Logotron). *Typesetter!* (Sherston Software) is popular in many primaries while schools with Archimedes will find *Pixel Perfect* (AVP) a very good starting point for DTP.

Indeed secondary schools with Arcs are quickly becoming spoilt for choice. *Impression* (Computer Concepts) is an excellent all round document processor combining both wordprocessing and DTP characteristics, suitable for pupils at key stages 3 and 4. A similar combination of features can be found in *Ovation* (Beebug) and *Tempest* (Clares Micro Supplies). These have just been completed and I will write about them in more detail in the near future.

Spelling (AT4) is one aspect of language teaching which lends itself to computer use. *Hands On Spelling* (ESM) is arguably the best spelling program to date on a BBC micro and is an evolution of *An Eye For Spelling* by spelling expert Charles Cripps.



Worlds without Words

Related to his research, this program develops a 'new' approach by teaching joined-up writing to improve a child's spelling.

With this program children begin to see that spelling is about letter patterns and how letters link together to form words. It uses the computer's ability to animate by producing flowing, joined-up strokes.

Enhancing language

The software available which can be used to enhance the classroom language programme is legion. Although the majority is aimed at primary-aged children, some is suitable for older pupils with special needs.

Podd (ESM) has earned itself an excellent reputation from the early days of computers in schools. It helps children develop their word power and explore a range of possibilities.

For older pupils, *Developing Tray* (free from most LEAs) is an excellent text revelation program which asks users to make predictions on content, context and meaning from a short passage. *Muddles* (SPA) is a program which encourages children to make sense from nonsense.

Other old chestnuts which I use time and again are *Supersquare* (GSN) for devising word squares and *Crossword Callup* (Northern Micromedia) for creating and printing crosswords, clues and solutions. The latter is now available for the Archimedes and the enhancements are superb.

Adventure software can generate an imaginary world rich in language; a good adventure can make the classroom a more exciting and stimulating learning environment for children. *Stig Of The Dump* and *The Worst Witch* (both Sherston Software) have immediate literary connections and can encourage careful reading.

Other software which can be used to write branching stories of the 'adventure type' includes *Fairy Lands*, *Farm Lands* (both Resource) and *Genesis* for older pupils. For a unique language-based adventure, try *Worlds Without Words* – it contains no language whatsoever!

The problem with many adventure games for the secondary sector is that they do not necessarily fit into the area the teacher wants to study. To find a program tailored to your particular syllabus requirements is highly unlikely.

An adventure generator like *The Last Adventure* (LTS) is one solution. Using this package, teachers can tailor an adventure around a particular text (for example a set novel) and present it as a follow-up task for pupils who have completed an initial reading of the book. Groups can then be encouraged to develop their own adventure.

All the language skills come into play when groups of children use *Genesis*. In addition to addressing every English attainment target, this Archimedes program also meets the National Curriculum requirements concerning datahandling.

Hypermedia on the Archimedes is still in its infancy. In the future, pupils may well enjoy using *Genesis* to obtain information and images from CD-Roms. They will probably be able to include these in their own 'Hypernewspaper', so that their audience can zoom in on a particular news story, expand the initial information and bring in other related stories with sound, graphical and video material from other databases. I wonder if the English National Curriculum orders of that generation will take the bit by the teeth and recognise such developments?

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Clares Micro Supplies, 98 Middlewich Road, Rudheath, Northwich, Cheshire CW9 7DA.
Computer Concepts, Gaddesden Place, Hemel Hempstead, Herts HP2 6EX.
ESM, Duke Street, Wisbech, Cambridge PE13 2AE.
GSN, 214 Stamford Street, Ashton-Under-Lyme, Lancashire OL6 6QH.
Longman Logotron, Dales Brewery, Gwydir Street, Cambridge CB1 2LJ.
LTS, Haydon House, Alcester Road, Studley, Warwickshire B80 7AN.
Northern Micromedia, Resources Centre, Coach Lane Campus, Newcastle-upon-Tyne NE7 7XA.
Resource, Exeter Road, Wheatley, Doncaster DN2 4PY.
Sherston Software, Swan Barton, Sherston, Malmsbury, Wiltshire SN16 0LL.
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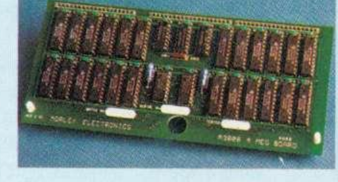
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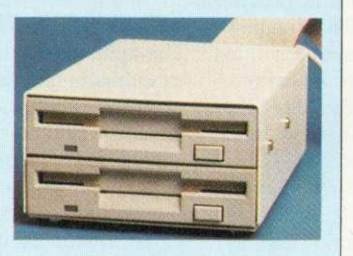
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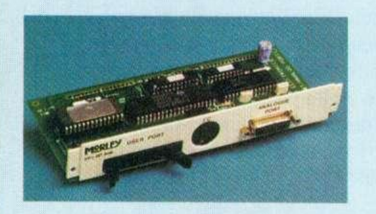


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Schema runs on all Archimedes and BBC A3000 computers with at least 1 Mb of memory and RISC OS.

Price £129.95 (Education £99.95)

Schema was produced in association with Acorn Computers Ltd.



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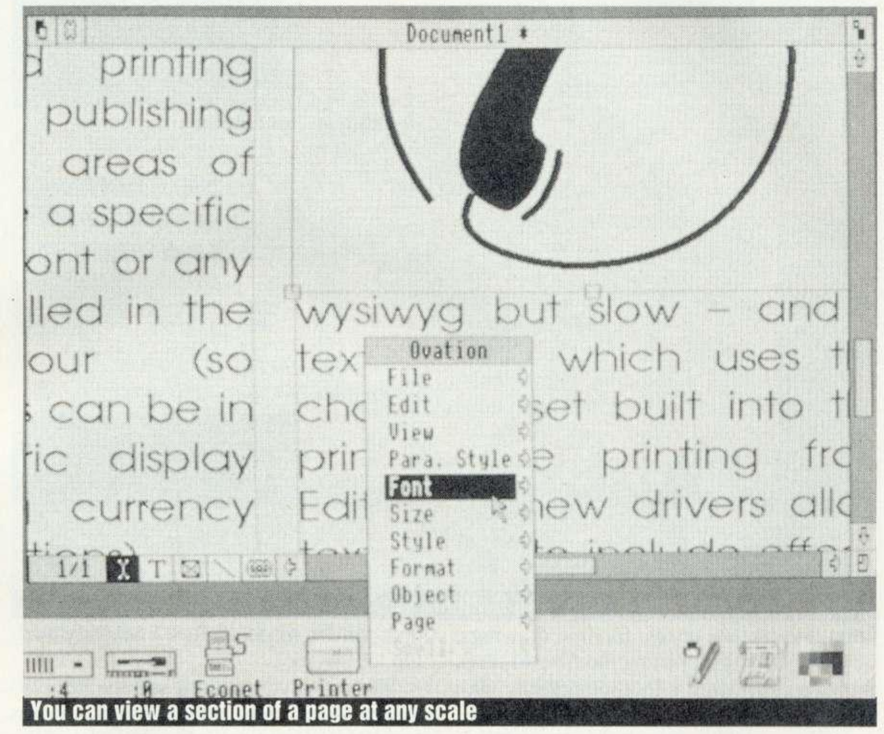
IN OVATION

GRAHAM BELL tries out Ovation, Beebug's contender in the desktop publishing market for the Archimedes

For better or worse, budding Archimedes desktop publishers have a choice of four or more page composition packages: Acorn's own *Desktop Publisher* (*BAU*, October 1989) was the first, followed by Computer Concepts' *Impression* (*BAU*, May 1990); Beebug has now released *Ovation* and Clares' *Tempest* debuted at the *BBC Acorn User* show.

It's for the best because would-be publishers now have a choice of software – but the downside is that these companies are locked into a struggle for sales when one or two might, more profitably, have looked for other applications to write.

It's not that DTP is an easy target: all four packages have suffered inordinate delays, and three have been sold incomplete, with the promise of future upgrades. All the software authors have underestimated the time that was necessary to develop their applications properly.



You can view a section of a page at any scale

Yet there is strength in diversity. Each of the packages has its own set of useful features, and each can be put to best use in different circumstances. We examine *Ovation* now, and *Tempest* will come under the microscope next month.

Ovation

Beebug's entrant comes in a chunky ringbinder and slip case: a commendable style of packaging also adopted by Acorn and Computer Concepts. In the binder are the manual and four discs, plus the usual set of release notes and a quick reference card.

One disc contains a set of fonts: Paladin, a Palatino equivalent; Swiss B, a Helvetica lookalike equivalent to Acorn's Homerton; Vogue, like Avant Garde; Symbol B, like the Symbol font built into Postscript laser printers – the equivalent to Acorn's Sidney font. None of the Acorn fonts are supplied, although the font module is.

Beebug's fonts are, for the most part, well up to the standard of the Acorn set. There is virtually no discernible difference between Swiss B and Homerton – the metrics (letter widths) are matched precisely. Vogue is particularly stylish for poster and display work, and Paladin is arguably better than Trinity for any long text that isn't in narrow columns.

But some of the weights, notably the italics and bold italics remain as yet unhinted, giving them a noticeably inferior look on screen or on a dot matrix printer. All are available separately, in Beebug's *Fontpack1*.

The other discs contain the Acorn printer drivers, the obligatory utilities and a selection of clipart – both scanned images and drawn symbols. The screen modes utility scores by allowing you to add your own 'designer modes', and Beebug's version of the *!Chars* character selector is neat enough to have become my standard.

The clipart contains a workaday selection of dingbat-like characters that can be cut out and put in your own work, but it's not as good as having bullets, stars and so on available as a real font along the lines of Acorn's Selwyn.

Finally there's the *Ovation* application itself: this cannot just be copied onto a spare floppy or your hard disc, but must be 'installed'.

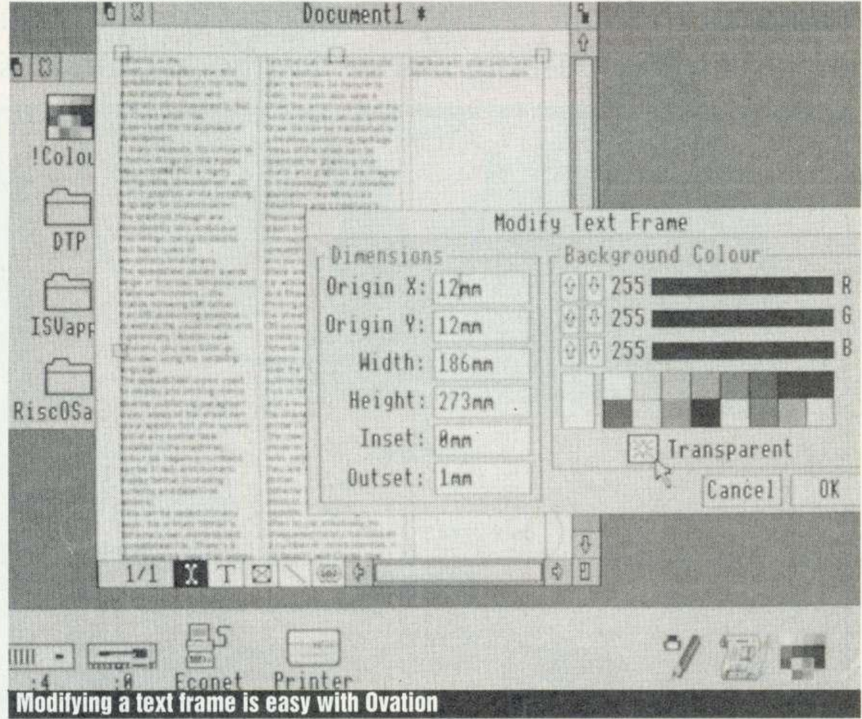
The installation program makes this easy, but it will only allow you to do it twice – you have to 'uninstall' it to put the software on another disc. There are even disc warnings about moving or renaming the *Ovation* directory.

This makes me worry. What if my hard disc goes down? Why can't I back up the original *Ovation* disc to guard against that going bad?

That said, the piracy protection has worked so far, and allowing two installations rather than just one allows some margin for error.

Once you've installed *Ovation*, double-clicking puts up the attractive 'scroll and quill' icon. Click on that and a new document window appears.

The window is constructed differently from normal: across the top and down the right are the usual selection of gadgets, but the lower scroll bar is replaced in part by a miniature toolbox giving the current page number and tools for text editing, for new



Modifying a text frame is easy with Ovation

text and picture boxes, for line drawings, and for linking (adjusting the flow of text).

You can choose a tool temporarily with Select or permanently with Adjust. It's attractive and works neatly, but what is wrong with the familiar *!Draw*-type toolbox – nothing new to learn and quicker to display?

As with most DTP packages, text, drawings or sprites are composed on the page in boxes or frames. New frames can be drawn with the text frame tool, and you can import text from *!Edit* text files (but not from anything else).

Passing almost everything through *!Edit* is painful, in particular for those with 1Mb machines, since it makes importing text a two-stage process: you can't run *!Edit* and *Ovation* together in 1Mb.

You can't pre-tag text so that it assumes the correct style automatically when you import it.

Text editing is pretty good, not quite up to the standard of *Impression*, but then *Impression* doesn't claim to be a major league wordprocessor. CTRL-X, C and V work as usual, and you can select words, lines, paragraphs and stories with two, three, four or five mouse clicks.

But CTRL-Z means 'delete the selected text', not 'clear the selection' as you might expect – a dangerous deviation. And I don't like the differentiation of RETURN and ENTER keys (ENTER means 'force to next frame').

If the text you import or type is too long, *Ovation* creates new pages as they are required – proving you're flowing text into the main frame on each page (the principal text frame, as *Ovation* terms it). Otherwise, text can be made to flow manually with the 'chain' tool.

While you can insert a soft hyphen into the text (like a normal hyphen, but it disappears if the word doesn't get broken at the end of the line), there's no automatic hyphenation or spell checking as yet. This upgrade, when it's available, will require 2Mb of memory. It's a serious shortcoming, particularly for long documents, where automatic hyphenation that you can trust is a great timesaver.

Unlike Acorn's *Desktop Publisher* or *Impression*, text frames can have more than one column, so a three-column page with a big headline needs two frames, not four. You can set the number of columns (up to eight) and the gaps between them, plus colours and the precise frame measurements from the frame dialogue box.

Apple Mac users familiar with *Quark Xpress* will immediately recognise this and many other features of *Ovation* – the program design has been modelled closely on *Xpress*. It's a good model to pick.

One dislikeable feature carried over from *Xpress* is the default text inset: characters won't go right to the edge of a new frame. You have to adjust the text inset from 1mm to zero so that the actual text area is what you want.

Insets are only useful in tinted or white-on-black boxes, and these are less common than plain vanilla frames.

There's a text outset too – the distance any underlying text is repelled. But this has to be the same on all the edges of a frame. You cannot set differing vertical and horizontal repels as you can with *Impression*.

Text styles follow the *Xpress* model too, with both paragraph styles which control all the usual features, and local styles which can over-ride any of them.

As an advance on *ADP*, *Ovation* allows either condensed or expanded text, tracking (squeezing all the letters together), all capitals, small caps (where lower case is replaced by three-quarter size capitals), and titles (where every word has an initial cap). And in contrast to *Impression*, there are both 'bold' and 'italic' buttons.

Most correctly, bold and italic are not effected like 'underlined' or '24 point', but are whole new typefaces. So they should be selected by changing the typeface, as *Impression* does. But it's just as simple to choose a bold version of whatever's already there!

You cannot do that with *Impression* but you can with *Ovation*. And new fonts don't need installing to allow this to work (as they do with *ADP*) – *Ovation* automatically tries italic and oblique for italics, bold, black, demi and so on for bold, medium, Roman and book for normal type. Because of this, certain Electronic Font Foundry typefaces are unusable.

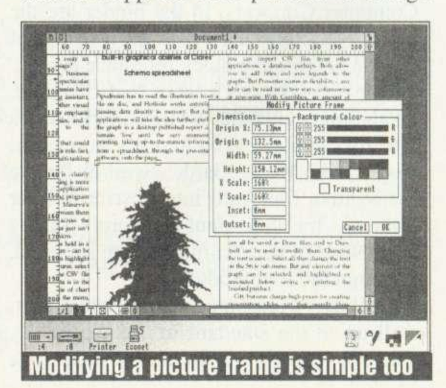
The local and paragraph styles give you control over the same range of effects, but you can't set up a paragraph using the easy-to-experiment local styles, then turn that automatically into a paragraph style to be used elsewhere.

You can, however, select an area, then apply to that area all the styles that are set at some other point in the document, which achieves almost the same effect (albeit not as neatly).

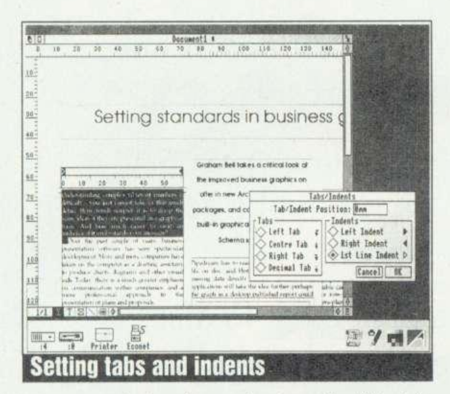
Defining new paragraph styles is another *Xpress*-like feature. The dialogue box gives a list of the styles and at the bottom is a summary of the one selected. A menu duplicating the local style effects allows you to alter any aspect of the current style and you can attach a style to an unused function key or control key combination.

Importing *!Draw* or *!Paint* graphics is straightforward, although unlike *Impression* or *ADP*, you have to specify the frame as a picture frame when you create it – all frames are not created equal.

There is a range of plain and decorative borders supplied. It is possible to design



Modifying a picture frame is simple too



Setting tabs and indents

your own, but only a subset can be fitted in a 1Mb machine. You can also control the aspect ratio of all illustrations – there is a dialogue box which sets x and y scales and positions exactly.

As well as text, drawings and sprites, you can draw lines within the frames by selecting the lines tool, and then using the mouse. You can select a line and move it, or change the thickness, choose a colour or dot pattern, and so on.

Line drawing is one of several operations where the mouse can be constrained – if you press SHIFT while using the mouse, it's limited to horizontal or vertical lines. Another is re-sizing a frame – pressing SHIFT keeps the original shape, while pressing CTRL restrains the frame to a square.

The major innovation in *Ovation* is the frame hierarchy. The first frame on a page is the principle text frame, derived from the master page.

Any new frames drawn within it become daughters – frames drawn within them become grand-daughters. A frame can be moved within its parent, but not outside it. And if you move a frame, all its descendants move too. Cutting and pasting affects the descendants as well.

This hierarchy can be useful. Imagine a picture and its caption moving – it is simple if you make the picture box a child of the caption box – the two then automatically go together.

Similarly, dropped capitals in a section of text move with the parent text frame, although they do not move if the text itself is edited.

But the hierarchy can be a nusiance too – a picture box cannot go just outside a column of text and cannot bleed off the page.

The interaction of parent frames and frame borders is not good. Complete freedom of movement can only be guaranteed if the new box is drawn starting from a point outside all other frames.

Making use of all hierarchy requires planning before you begin – not necessarily a bad thing.

It is ironic that this hierarchy feature, so strongly identified with *Quark Xpress* in the past, has been removed from the latest version, just as it has been inherited by *Ovation*. Multiple selection and grouping like *!Draw* is the most flexible way to implement this feature – the fixed hierarchy is too strict and limiting.

Ovation's master pages follow the *Impression* model – there can be several in a document, one per chapter.

On the master page there is at least one text frame, which defines the overall area for the text. It can have several columns and can be most of the structure that a document needs.

The principle text frame is automatically linked to previous and subsequent pages, so text flows smoothly and new pages are created as necessary when you import a long text file.

Other master page frames appear as normal on each new page created, though unlike *Impression*, changes aren't retroactive – old pages don't acquire new features of the master page.

You can put guidelines on the master page too – these are pulled out of the rulers at the top and left-hand side of the page, and new frames snap to them as well as the column guides (which are normally the same as the columns of the principal text frame).

The master page and set of paragraph styles are saved when you save a stylesheet file, and you can customise *Ovation* by replacing the Default stylesheet in the *Ovation* directory.

Summary

Ovation scores highly for its good 'Riscware' style: it's a very mainstream DTP package that will be familiar to Mac users as well as to established Archimedes fans. You can edit several different documents at once (up to six, memory permitting), view them on screen at any size, there are lots of timesaving features and some very neat touches. The automatic page creation, precise setting of tabs and automatic duplication of frames or lines speed things up immensely, as do the host of quick key short cuts available.

A completed Ovation page

Style controls like bold and italic, small caps and tracking are well ahead of *Impression*. And neat features like the timed autosave, frame and line constraint, and a percent finished mark while printing all give a feeling of quality and depth.

But the package must be criticised for what isn't there: spelling and hyphenation are the obvious missing features which *Impression* does well, but the lack of import filters for any wordprocessors, and the lack of pre-tagging is just as important. Measurements are limited to millimetres, inches and points – you cannot use picas – and there's no frame locking. It's too easy to move a frame by accident.

Finally, if you have a 1Mb machine, you're in for many of the same problems as with *Desktop Publisher* – short documents, don't use too big a screen mode...

Little can be said about the hierarchy of frames. Either you'll think it a boon or a bore. I like the multiple selection it allows, but it is more suited to very structured, disciplined page designs – not the suck-it-and-see approach.

Ovation's low price suggests Beebug isn't pitching at the professional publishing market where the strict hierarchy of *Xpress* has been very successful, yet much of the rest of *Ovation* is suitable for the professional. With hyphenation and import filters, it would be excellent.

Without, it's merely good.

WHAT'S MISSING?

None of the Arc DTP packages have:

- Widow and orphan control (a widow is a single word left on a line at the end of a paragraph)
- Full control over hyphenation – like what is the minimum length of word to be split, or the maximum number of hyphenated lines in a row
- A table creation mode. Dragging tab stops with the mouse or typing table text onto a spreadsheet-like grid would help
- Kerning tables. Professional typesetters use tables to show how close a W should move to an A. Currently this can only be done by hand on the Arc
- Rotated text. A difficult problem, as the Arc does not allow editing of rotated text. But text could be turned into a graphic (like Fontdraw or FontFX) then rotated...
- Rotated pictures. Currently all graphics must be rotated in *!Draw* or *!Paint*
- Run-arounds (running text around the picture, not around the picture frame)
- Automatic bleed allowances and registration marks for professional typesetting

LASER • DIRECT



THE *FASTEST* ARCHIMEDES LASER PRINTER

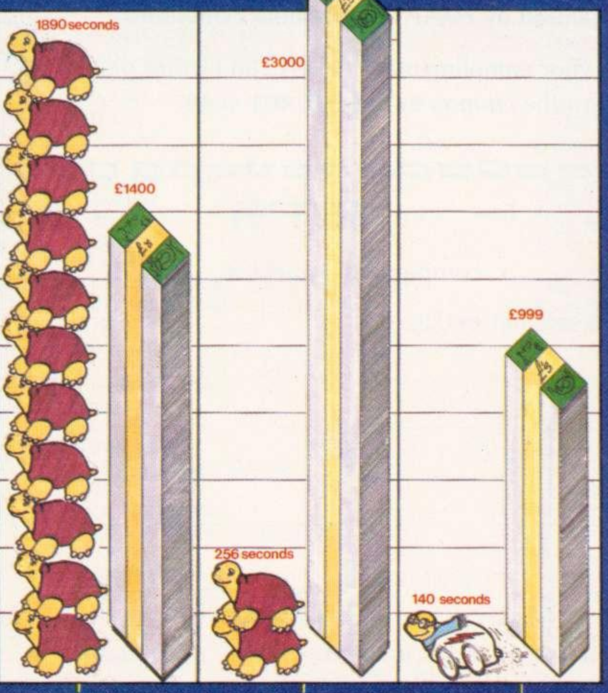
The LaserDirect consists of an interface board, our RISC OS printer driver software, and a special version of the 300 dpi Qume six page per minute printer. Because the board drives the printer 'engine' directly, not only does this save a complex controller board usually resident in the printer, but it also means it prints very much faster than traditional printers. The speed is a combined result of our optimised RISC OS printer driver, the RISC processor and the unique 2Mbit/second data link to the printer. One other significant advantage is that the LaserDirect uses the Acorn outline fonts installed in the machine, so guaranteeing all fonts seen on screen will print - no need to make sure the fonts match those installed in your PostScript printer.

Special features - Software on board means it is always available and can be automatically installed on startup - no loading from disc • The LaserDirect offers special links to other Computer Concepts software. For example, when combined with the new Scan-Light Plus software, it offers a direct scan to print facility. It can scan and print a full A4 page in under a minute. • A PostScript compatible interpreter will also be available, turning the Archimedes and LaserDirect printer into a very fast PostScript compatble printer (but using the Acorn outline fonts).

LaserDirect Qume (incl. printer, interface board, and software) £999 +VAT & carriage

The result is a printer whose quality is the same or better than traditional lasers, that can use all RISC OS outline fonts, that is faster than traditional printers, and costs less.

The Qume Liquid Crystal Printer is not technically a laser printer. Instead of having a laser and spinning mirror arrangement, this printer has a conventional light source shining through a liquid crystal shutter array. The result is fewer moving parts, a lower cost and a more reliable printer. It also occupies a very small amount of desk space—42cm by 42cm, no more than a standard dot-matrix.



Compatible with all applications that use RISC OS printer drivers, e.g. Draw, Paint, Pipedream, ADP, Impression etc.

Graph shows time taken to print a typical 10 page document with a selection of different fonts, together with typical price.

Laser Direct—
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COMPATIBILITY

Program	Page	BBC B	B+/128	Master 128	Master Compact	Electron	Arc	6502SP/ Turbo	ADFS	Econet	Shadow Ram	Monthly Disc
Risc Revue	34						■		■	■	■	■
Eight Bits	68											
Listing 1		■	■	■	■			■	■	■	■	■
Listing 2		■	■	■	■	■		■	■	■	■	■
Listing 3		■	■	■	■	■		■	■	■	■	■
Plotters	74											
Listing 1		■	■	■	■	■	■	■	■	■	■	■
Picpac (1)	80											
Listing 1		■	■	■	■	■		■	■	■		■
Listing 2		■	■	■	■	■		■	■	■		■
Listing 3		■	■	■	■	■		■	■	■		■
Listing 4		■	■	■	■	■		■	■	■		■
Listing 5		■	■	■	■	■		■	■	■		■

Note (1) ADFS Users only

MUSIC

Listing 1

```
"$keys" []  "RUN" []     "adval" []
"advc" []   "advi" []    "change" []
"dmix" []   "dojoy" []   "dofire" []
"down" []   "dpad" []    "fire" []
"hit" []    "init" []    "ins2" []
"joy" []    "key" []     "mix" []
"pad" []    "play" []    "simc" []
"simi" []   "tab" []     "test" []
"tk" []     "uta" []     "testjoy" []

"$keys" [REP( LEN NOT )UNTIL(
1 $- ASC key )REP
$2
]

"RUN" [7 MODE MENUDISP
%
%            Joystick Music
%
%Simple instrument panel%  "simc"dpad
%Advanced instrument panel%"advc"dpad
%Mixing Desk%dmix
%
%
%
%
%
%
%
MENU
]

"adval" [ &80 &FFF4 CODE #2 ]
"advc" [ """advi""GET play advi tab"$+
]

"advi" [2 CHANS
1 CHAN
 Pure        Deepvib     Tailed
  OFF RM     OFF SYNC
   1 SHIFT    0 FM         ON PSENS
2 CHAN
 Pipes       Deepvib     Swell
 128 AMP
EVERY CHAN
 OFF PHSET
]

"change" [#2121 #- #11
 2 #>
#12 -2 #< OR
#11 IF( #213
)ELSE(
#12
)IF
#2
]

"dmix" ["MAIN" $+
init down key  down key
13 key
"play" $keys
9 key
]

"dofire" [OFF
1 SHARE
REP(
REP(
 fire
#12 #212 #= NOT )UNTIL( IDLE )REP
#11 NOT IF( OFF GATE )IF
)REP
]

"dojoy" [2 joy 1 joy
REP(
8 FOR(
REP( IDLE
 1 joy change )UNTIL(
#12
 2 joy change
#213 #213 #12 #213 )UNTIL(
 )REP
COUNT VOICE
 2 joy            PITCHF
 1 joy -144  #/ #2 PAN
 hit
)FOR )REP
]

"down" [ 142 ]
"dpad" ["MAIN"$+
 $12 pad
]

"fire" [ 0 adval 1 AND
]

"hit" [
ON GATE
fire NOT IF( 12,/ OFF GATE \ )IF
]

"init" [ 1 15 &FFF4 CODE #2 #2
]

"ins2" [2 CHANS
1 CHAN
 Pure        Delvib       Swell
  OFF RM     OFF SYNC  ,
  130 SHIFT   50 FM        OFF PSENS
2 CHAN
 Clear       Flat         Long
 128 AMP
EVERY CHAN
 ON PHSET
]

"joy" [ adval  2 #/ #2 #11 &8000 AND #+
32 #/ #2
&200 #-
]

"key" [#B12  138 &FFF4 CODE #2 #2
]

"mix" [M5MIX
1 SHARE 8 VOICES simi
 1 VOICE 128 VOL 0 PAN
 2 VOICE 128 VOL 0 PAN
 3 VOICE 128 VOL 0 PAN
 4 VOICE 128 VOL 0 PAN
 5 VOICE 128 VOL 0 PAN
 6 VOICE 128 VOL 0 PAN
 7 VOICE 128 VOL 0 PAN
 8 VOICE 128 VOL 0 PAN
PNUM SHARE
]

"pad" [init down key
13 key
$keys
13 key
```

Continued ▶

MUSIC

◀ Continued

```
]

"play" [READY mix
 1 P( dojoy )P
2 P( dofire )P GO
1 SHARE
]

"simc" [ """simi""GET play simi tab"$+
]

"simi" [2 CHANS
1 CHAN

 Sharp        Wow           Reverse

2 CHAN

 Clear        Flat          Long

 128 AMP
]

"tab" [ "FX138,0,9"OSCLI
]

"test" [ REP( 4 FOR(
COUNT joy $STR 5 $PAD $OUT )FOR
0 adval 3 AND  $STR 5 $PAD $OUT
13 #OUT )REP
]

"testjoy" [ REP( 1 joy NOUT SP SP SP
SP 13 #OUT )REP
]

"tk" [ $12 $keys
]

"uta" [2 CHANS
1 CHAN
 Broad        Deepvib       Tailed
  OFF RM      OFF SYNC
   1 SHIFT     0 FM          ON PSENS
2 CHAN
 Pipes        Deepvib       Swell
 128 AMP
EVERY CHAN
 OFF PHSET
]
```

RISC REVUE

Listing 1

```
10 REM >Drawballs (RR1)
20 REM by Barry Wickett
30 REM for Archimedes only
40 REM (c) BAU November 1990
50 :
60 MODE 12
70 OFF
80 DIM sp% &17000
90 !sp%=&17000
100 sp%!4=0
110 sp%!8=16
120 sp%!12=16
130 rad%=100
140 base%=0
150 maxframes%=30
160 text$="BBC Acorn User "
170 mx%=LEN(text$)*8-1
180 my%=7
190 la%=50
200 ma%=130
210 k1=my%/(ma%-la%)
220 step=mx%/maxframes%
230 frame%=0
240 DIM c%(mx%,my%)
250 :
260 COLOUR 14,0,0,255
270 COLOUR 15,255,0,0
280 FOR c%=0 TO 13
290 COLOUR c%,c%<<4,c%<<4,c%<<4
300 NEXT c%
310 COLOUR 15
320 PRINTTAB(0,31);text$;
330 GCOL 2,14
340 MOVE 0,8
350 MOVE 0,my%*4
360 PLOT 85,mx%*2,my%*4
370 FOR x%=0 TO mx%
380 FOR y%=0 TO my%
390 c%(x%,y%)=POINT(x%*2,y%*4)
400 NEXT y%
410 NEXT x%
420 :
430 CLS
440 REPEAT
450 base%+=1
460 FOR end=1 TO 2
470 IF end=1 THEN col=base% ELSE col=1
4-base%
480 COLOUR col,col<<4,col<<4,col<<4
490 GCOL col
500 VDU 26
510 IF col<7 THEN VDU 24,0;0;rad%;rad%
*2;
520 IF col>7 THEN VDU 24,rad%;0;rad%*2
;rad%*2;
530 ELLIPSE FILL rad%,rad%,COS((PI/14)
*col)*rad%,rad%
540 NEXT end
550 UNTIL base%=7
560 SYS "OS_SpriteOp",16+256,sp%,"ball
",0,0,0,rad%*2,rad%*2
570 :
580 ORIGIN rad%,rad%
590 FOR ix=0 TO mx%+1-step STEP step
600 FOR a=0 TO 180 STEP 1.2
610 x%=((mx%/360)*a+ix) MOD mx%
620 ax%=-COSRAD(a)*rad%
630 FOR b%=la% TO ma% STEP 2
640 y%=k1*(b%-la%)
650 IF c%(x%,y%)>0 THEN
660 GCOL 0,c%(x%,y%)
670 POINT ax%*SINRAD(b%),-COSRAD(b%)*r
ad%
680 ENDIF
690 NEXT b%
700 NEXT a
710 frame%+=1
720 SYS "OS_SpriteOp",16+256,sp%,"fram
e"+STR$(frame%),0,-rad%,-rad%,rad%,rad%
730 SYS "OS_SpriteOp",34+256,sp%,"ball
",-rad%,-rad%
740 NEXT ix
750 SYS "OS_SpriteOp",25+256,sp%,"ball
"
760 SYS "OS_SpriteOp",12+256,sp%,"ball
s"
770 END
```

Listing 2

```
10 REM >BounceBall (RR2)
20 REM by Barry Wickett
30 REM for Archimedes only
40 REM (c) BAU November 1990
50 :
60 MODE 12
70 DIM sp% &17000
80 !sp%=&17000
90 SYS "OS_File",255,"balls",sp%+4
100 DIM lx%(2),ly%(2)
110 rad%=100
120 maxframes%=30
130 finc%=1
140 g%=-2
150 e=2/3
160 bank=2
170 frame%=1
180 x%=640-rad%
190 y%=0
200 lx%(1)=x%
210 lx%(2)=x%
220 ly%(1)=y%
230 ly%(2)=y%
240 spinspeed=.5
250 spincount=0
260 COLOUR 14,0,0,255
270 COLOUR 15,255,0,0
280 VDU 19,0,24,50,50,50
290 FOR c%=0 TO 13
300 COLOUR c%,c%<<4,c%<<4,c%<<4
310 NEXT c%
320 :
330 SYS "OS_Byte",112,bank
340 CLS
350 REPEAT
360 xv%=(RND(10)+10)*(RND(2)-1)*2-3
370 yv%=RND(50)+20
380 stop=FALSE
390 REPEAT
400 IF x%+xv%<0 OR x%+xv%+rad%*2>1279
THEN
410 xv%=-xv%
420 finc%=-finc%
430 ENDIF
440 x%+=xv%
450 IF y%+yv%<0 THEN
460 yv%=-yv%*e
470 IF ABS(yv%)<9 THEN stop=TRUE
480 ENDIF
490 y%+=yv%
500 yv%+=g%
510 GCOL 0,0
520 spincount+=spinspeed
530 IF spincount>=1 THEN
540 frame%+=finc%
550 IF frame%<1 THEN frame%=maxframes%
560 IF frame%>maxframes% THEN frame%=1
570 spincount=0
580 ENDIF
590 RECTANGLE FILL lx%(bank),ly%(bank)
,rad%*2,rad%*2
600 SYS "OS_SpriteOp",34+256,sp%,"fram
e"+STR$(frame%),x%,y%
610 lx%(bank)=x%
620 ly%(bank)=y%
630 WAIT
640 SYS "OS_Byte",113,bank
650 bank=3-bank
660 SYS "OS_Byte",112,bank
670 UNTIL stop=TRUE
680 UNTIL FALSE
```

Listing 3

```
10 REM >Annie (RR3)
20 REM by David Murphy
30 REM for Archimedes only
40 REM (c) BAU November 1990
50 :
60 now_date=FNdate
70 now_month=FNmonth
80 now_year=FNyear
90 READ birth_date,birth_month,birth_
year$,anni$,name$,details$
100 WHILE NOT (birth_date=0)
110 diff=FNday_number(now_date,now_mon
th)-FNday_number(birth_date,birth_month)
120 IF (now_month=12 AND birth_month=1
) THEN diff-=365
130 IF (now_month=1 AND birth_month=12
) THEN diff+=365
140 IF ABS(diff)<8 THEN PROCdetails(bi
rth_date,birth_month)
150 READ birth_date,birth_month,birth_
year$,anni$,name$,details$
160 ENDWHILE
170 END
180 :
190 DEF FNdate=VAL(MID$(TIME$,5,2))
200 DEF FNmonth=(INSTR("JanFebMarAprMa
yJunJulAugSepOctNovDec",MID$(TIME$,8,3))
 DIV 3)+1
210 DEF FNyear=VAL(MID$(TIME$,12,4))
220 :
230 DEF FNday_number(date,month)=VAL(M
ID$("000031059090120151181212243273304333
4",(month*3)-2,3))+date
240 :
250 DEF PROCdetails(birth_date,birth_m
onth)
260 PRINT name$;" ";anni$;" ";birth_da
te;" ";MID$("JanFebMarAprMayJunJulAugSep
OctNovDec",(birth_month*3)-2,3);
270 IF birth_year$<>"??" PRINT" (";now
_year-VAL(birth_year$);" years)";
280 PRINT " ";details$
290 ENDPROC
300 :
310 DATA 24,7,??,Birthday,Adrian Murph
y,Bolahaul House
320 DATA 30,7,1966,Birthday,David Murp
hy,Bolahaul House
330 DATA 31,12,1972,Anniversary,TEST N
AME,TEST DETAILS
340 REM End of Data
350 DATA 0,0,??,AAA,XXX,YYY
```

Listing 4

```
10 REM >Sideways (RR4)
20 REM by P Drinkwater
30 REM for Archimedes only
40 REM (c) BAU November 1990
50 :
60 MODE 1
70 VDU 23,16,12|
80 DIM defn 9,mat1(8,8),mat2(8,8)
90 FOR ch=32 TO 127
100 mat1()=0
110 mat2()=0
120 ?defn=ch
130 SYS "OS_Word",10,defn
140 FOR c=1 TO 8
150 PROCbinarycon(defn?c,c)
160 NEXT
170 FOR x=1 TO 8
180 FOR y=1 TO 8
190 mat2(x,y)=mat1(9-y,9-x)
200 NEXT
210 NEXT
220 VDU 23,ch
230 FOR x=1 TO 8
240 PROCconvtodec(x)
250 NEXT
260 NEXT
270 END
280 :
290 DEF PROCbinarycon(val,r)
300 IF val>=128 THEN val-=128:mat1(1,r
)=1
310 IF val>=64 THEN val-=64:mat1(2,r)=
1
320 IF val>=32 THEN val-=32:mat1(3,r)=
1
330 IF val>=16 THEN val-=16:mat1(4,r)=
1
340 IF val>=8 THEN val-=8:mat1(5,r)=1
350 IF val>=4 THEN val-=4:mat1(6,r)=1
360 IF val>=2 THEN val-=2:mat1(7,r)=1
370 IF val>=1 THEN val-=1:mat1(8,r)=1
380 ENDPROC
390 :
400 DEF PROCconvtodec(x)
410 LOCAL c,v
420 v=0
430 FOR c=1 TO 8
440 v+=mat2(c,x)*2^(c-1)
450 NEXT
460 VDU v
470 ENDPROC
```

Listing 5

```
10 REM >ChangeSWIs (RR5)
20 REM by Dave Acton
30 REM for Archimedes only
40 REM (c) BAU November 1990
50 :
60 ON ERROR CLOSE#0:PRINT'REPORT$" at
line ";ERL:END
70 DIM w% &100,w2% &100
80 REPEAT
90 INPUT"BASIC program: "source$
100 SYS "OS_File",5,source$ TO exists%
110 UNTIL exists%=1
120 REPEAT
130 INPUT"Save new version as: "dest$
140 UNTIL dest$<>""
150 in%=OPENIN(source$)
160 out%=OPENOUT(dest$)
170 PRINT"Please wait..."
180 BPUT#out%,BGET#in%
190 REPEAT
200 ?w%=BGET#in%
210 IF ?w%=&FF THEN
220 BPUT#out%,?w%
230 ELSE
240 w%?1=BGET#in%
250 w%?2=BGET#in%
260 SYS "OS_GBPB",4,in%,w%+3,w%?2-3
270 a%=w%+3
280 b%=w2%+3
290 !w2%=!w%
300 WHILE ?a%<>13
310 IF ?a%=&C8 AND a%?1=&99 THEN
320 !b%=!a%
330 a%+=2
340 b%+=2
```

Continued ▶

RISC REVUE

◀ Continued

```
350 sys$=""
360 WHILE ?a%=32
370 ?b%=?a%
380 a%+=1
390 b%+=1
400 ENDWHILE
410 IF ?a%=ASC"""" THEN
420 a%+=1
430 WHILE ?a%<>ASC""""
440 sys$+=CHR$(?a%)
450 a%+=1
460 ENDWHILE
470 a%+=1
480 SYS "OS_SWINumberFromString",,sys$
TO num%
490 $b%="&"+STR$~num%
500 b%+=LEN($b%)
510 ENDIF
520 ELSE
530 ?b%=?a%
540 a%+=1
550 b%+=1
560 ENDIF
570 ENDWHILE
580 ?b%=?a%
590 w2%?2=b%+1-w2%
600 SYS "OS_GBPB",2,out%,w2%,w2%?2
610 ENDIF
620 UNTIL EOF#in%
630 CLOSE#in%
640 CLOSE#out%
650 OSCLI("SETTYPE "+dest$+" BASIC")
660 PRINT"Process complete"
670 END
```

Listing 6

```
10 REM >SWItest (RR6)
20 :
30 TIME=0
40 FOR i%=1 TO 10000
50 SYS "OS_Byte",134
60 NEXT
70 PRINT"Time=";TIME/100;" secs"
80 END
```

Listing 7

```
10 REM >PrettyTok (RR7)
20 REM by Dave Acton
30 REM for Archimedes only
40 REM (c) BAU November 1990
50 :
60 MODE 0
70 FOR token%=0 TO 50
80 PRINT"Token ";token%;": ";
90 SYS "OS_PrettyPrint",CHR$27+CHR$to
ken%+CHR$0,0,"Special string"+CHR$0
100 PRINT
110 NEXT
120 END
```

EIGHT BITS

Listing 1

```
10Ø REM Large Teletext Text
2Ø REM by Martin Osborne
3Ø REM for B/B+/M/C
4Ø REM (c) BAU Nov 9Ø
5Ø :
6Ø DIM code 25Ø
7Ø PROCassemble
8Ø MODE 7
9Ø PRINTTAB(Ø,7)
10Ø PROCprint("  BBC",2)
11Ø PROCprint("  Acorn",3)
12Ø PROCprint("  User",6)
13Ø END
14Ø :
15Ø DEF PROCprint(a$,colour)
16Ø IF LEN(a$)>9 PRINT "Too long":END
17Ø VDU 144+colour,1Ø,8
18Ø VDU 144+colour,1Ø,8
19Ø VDU 144+colour,11,11
20Ø FOR j=1 TO LEN(a$)
21Ø ?&78=ASC(MID$(a$,j,1))
22Ø CALL code
23Ø NEXT
24Ø PRINT TAB(Ø,VPOS+3);
25Ø ENDPROC
26Ø :
27Ø DEF PROCassemble
28Ø oswrch=&FFEE
29Ø FOR pass=Ø TO 2 STEP 2
30Ø P%=code
31Ø [OPT pass
32Ø LDA #1Ø
33Ø LDX #&78
34Ø LDY #Ø
35Ø JSR &FFF1
36Ø .b
37Ø LDA #4
38Ø STA &7Ø
39Ø .c
40Ø LDA #Ø
41Ø ROL &79
42Ø BCC d
43Ø LDA #1
44Ø .d
45Ø ROL &79
46Ø BCC e
47Ø ORA #2
48Ø .e
49Ø ROL &7A
50Ø BCC f
51Ø ORA #4
52Ø .f
53Ø ROL &7A
54Ø BCC g
55Ø ORA #8
56Ø .g
57Ø ROL &7B
58Ø BCC h
59Ø ORA #16
60Ø .h
61Ø ROL &7B
62Ø BCC i
63Ø ORA #64
64Ø CLC
65Ø .i
66Ø ADC #&AØ
67Ø JSR oswrch
68Ø DEC &7Ø
69Ø BNE c
70Ø LDA #1Ø
71Ø JSR oswrch
72Ø LDA #8
73Ø JSR oswrch
74Ø JSR oswrch
75Ø JSR oswrch
76Ø JSR oswrch
77Ø :
78Ø LDA #4
79Ø STA &7Ø
80Ø .j
81Ø LDA #Ø
82Ø ROL &7C
83Ø BCC k
84Ø LDA #1
85Ø .k
86Ø ROL &7C
87Ø BCC l
88Ø ORA #2
89Ø .l
90Ø ROL &7D
91Ø BCC m
92Ø ORA #4
93Ø .m
94Ø ROL &7D
95Ø BCC n
96Ø ORA #8
97Ø .n
98Ø ROL &7E
99Ø BCC o
100Ø ORA #16
101Ø .o
102Ø ROL &7E
103Ø BCC p
104Ø ORA #64
105Ø CLC
106Ø .p
107Ø ADC #&AØ
108Ø JSR oswrch
109Ø DEC &7Ø
110Ø BNE j
111Ø LDA #1Ø
112Ø JSR oswrch
113Ø LDA #8
114Ø JSR oswrch
115Ø JSR oswrch
116Ø JSR oswrch
117Ø JSR oswrch
118Ø LDA #4
119Ø STA &7Ø
120Ø .q
121Ø LDA #Ø
122Ø ROL &7F
123Ø BCC r
124Ø LDA #1
125Ø .r
126Ø ROL &7F
127Ø BCC s
128Ø ORA #2
129Ø .s
130Ø ROL &8Ø
131Ø BCC t
132Ø ORA #4
133Ø .t
134Ø ROL &8Ø
135Ø BCC u
136Ø ORA #8
137Ø CLC
138Ø .u
139Ø ADC #&AØ
140Ø JSR oswrch
141Ø DEC &7Ø
142Ø BNE q
143Ø LDA #11
144Ø JSR oswrch
145Ø JSR oswrch
146Ø RTS
147Ø ]
148Ø NEXT
149Ø ENDPROC
```

Listing 2

```
1Ø REM Ident Command
3Ø REM for B/B+/M/C/E
4Ø REM by Andrew Pepperell
5Ø REM (c) BAU Nov 9Ø
6Ø :
7Ø PROCassemble
8Ø PROCchecksum
9Ø name$="Ident"
10Ø OSCLI("SAVE "+name$+" "+STR$~start
+" +1FF")
11Ø END
12Ø :
13Ø DEFPROCassemble
14Ø osfile=&FFDD
15Ø osfind=&FFCE
16Ø osargs=&FFDA
17Ø oswrch=&FFEE
18Ø block=&A8
19Ø pointer=&AE
20Ø checks=6
21Ø start=&9ØØ
22Ø FOR pass=Ø TO 3 STEP 3
23Ø P%=start
24Ø [OPT pass
25Ø LDX #pointer MOD 256
26Ø LDY #Ø
27Ø LDA #1
28Ø JSR osargs
29Ø JSR getname
30Ø LDX #name MOD 256
31Ø LDY #name DIV 256
32Ø JMP existence
33Ø .getname
34Ø LDY #Ø
35Ø LDA (pointer),Y
36Ø CMP #13
37Ø BEQ syntax
38Ø .getloop
39Ø LDA (pointer),Y
40Ø STA name,Y
41Ø CMP #13
42Ø BEQ finish
43Ø INY
44Ø JMP getloop
45Ø .finish
46Ø RTS
47Ø .exists
48Ø STX param
49Ø STY param+1
50Ø LDX #param MOD 256
51Ø LDY #param DIV 256
52Ø LDA #5
53Ø JSR osfile
54Ø JMP compare
55Ø .param
56Ø EQUS (STRING$(18,CHR$(Ø)))
57Ø .syntax
58Ø BRK
59Ø EQUB (22Ø)
60Ø EQUS ("IDENT <fname>")
61Ø EQUB (13)
62Ø BRK
63Ø .table
64Ø EQUW (&8Ø21)
65Ø EQUW (basic)
66Ø :
67Ø EQUW (&8Ø23)
68Ø EQUW (basic)
69Ø :
70Ø EQUW (&8Ø2B)
71Ø EQUW (basic)
72Ø :
73Ø EQUW (&8ØØØ)
74Ø EQUW (romimage)
75Ø :
76Ø EQUW (&FFFF)
77Ø EQUW (data)
78Ø :
79Ø EQUW (&ØØØØ)
80Ø EQUW (data)
81Ø :
82Ø .compare
83Ø LDA param+6
84Ø STA block
85Ø LDA param+7
86Ø STA block+1
87Ø LDX #Ø
88Ø .compareloop
89Ø LDA table,X
90Ø STA block+2
91Ø INX
92Ø LDA table,X
93Ø STA block+3
94Ø INX
95Ø LDA table,X
96Ø STA block+4
97Ø INX
98Ø LDA table,X
99Ø STA block+5
100Ø INX
101Ø LDA block
102Ø CMP block+2
103Ø BNE notmatched
104Ø LDA block+1
105Ø CMP block+3
106Ø BNE notmatched
107Ø JMP matched
108Ø .machinecode
109Ø BRK
110Ø EQUB (254)
111Ø EQUB (11)
112Ø EQUS ("Machine Code")
113Ø EQUB (13)
114Ø BRK
115Ø .notmatched
116Ø CPX #checks*4
117Ø BNE compareloop
118Ø JMP machinecode
119Ø .matched
120Ø LDY #Ø
121Ø .matchedloop
122Ø LDA (block+4),Y
123Ø BEQ finishmatch
124Ø JSR oswrch
125Ø INY
126Ø JMP matchedloop
127Ø .finishmatch
128Ø RTS
129Ø .basic
130Ø EQUS ("BASIC")
131Ø EQUB (13)
132Ø EQUB (1Ø)
133Ø EQUB (Ø)
134Ø .romimage
135Ø EQUS ("Rom Image")
136Ø EQUB (13)
137Ø EQUB (1Ø)
138Ø EQUB (Ø)
139Ø .data
140Ø EQUS ("Program Data")
141Ø EQUB (13)
142Ø EQUB (1Ø)
143Ø EQUB (Ø)
144Ø .existence
145Ø LDA #&CØ
146Ø JSR osfind
147Ø PHA
148Ø TYA
149Ø PHA
150Ø LDA #Ø
151Ø LDY #Ø
152Ø JSR osfind
153Ø PLA
154Ø TAY
155Ø PLA
156Ø CMP #Ø
157Ø BEQ notthere
158Ø JMP exists
159Ø .notthere
160Ø BRK
161Ø EQUB (214)
162Ø EQUS ("No such file")
163Ø EQUB (13)
```

Continued ▶

EIGHT BITS

◀ Continued

```
1640 BRK
1650 .name
1660 ]
1670 NEXT
1680 ENDPROC
1690 :
1700 DEFPROCchecksum
1710 I%=0
1720 FOR M%=start TO P%-1
1730 I%=I%+?M%
1740 NEXT
1750 IF I%=27276 ENDPROC
1760 VDU 7
1770 PRINT "Error in code"
1780 PRINT "Discrepancy :";ABS(27276-I%

1790 END
```

Listing 3

```
10 REM Auto Save BASIC
30 REM by Andrew Pepperell
40 REM for B/B+/M/C/E
50 REM (c) BAU Nov 90
60 :
70 PROCassemble
80 PROCchecksum
90 PROCsave
100 END
110 :
120 DEFPROCassemble
130 norm$="0E00"
140 osasci=&FFE3
150 oscli=&FFF7
160 digit=&70
170 temp=&72
180 start=&900
190 FOR pass=0 TO 3 STEP 3
200 P%=start
210 [
220 OPT pass
230 JMP check
240 .alright
250 JSR getname
260 JSR getaddresses
270 JSR save
280 RTS
290 :
300 .checkdata
310 EQUB (244)
320 EQUB (32)
330 EQUB (ASC">")
340 .check
350 LDA &19
360 STA temp
370 LDA &18
380 STA temp+1
390 LDA temp
400 CLC
410 ADC #4
420 STA temp
430 LDA temp+1
440 ADC #0
450 STA temp+1
460 LDY #0
470 .checkloop
480 LDA (temp),Y
490 CMP checkdata,Y
500 BNE notright
510 INY
520 CPY #3
530 BNE checkloop
540 JMP alright
550 :
560 .notright
570 BRK
580 EQUB (4)
590 EQUS ("Check first line")
600 BRK
610 :
620 .getname
630 LDA temp
640 CLC
650 ADC #3
660 STA temp
670 LDA temp+1
680 ADC #0
690 STA temp+1
700 LDY #0
710 .nameloop
720 LDA (temp),Y
730 CMP #13
740 BEQ finished
750 CMP #32
760 BEQ finished
770 STA fname,Y
780 INY
790 JMP nameloop
800 .finished
810 CPY #0
820 BEQ notright
830 CPY #10
840 BCS notright
850 RTS
860 :
870 .getaddresses
880 LDA &18
890 JSR hex
900 LDA digit
910 STA page
920 LDA digit+1
930 STA page+1
940 LDA &19
950 JSR hex
960 LDA digit
970 STA page+2
980 LDA digit+1
990 STA page+3
1000 LDA &13
1010 JSR hex
1020 LDA digit
1030 STA top
1040 LDA digit+1
1050 STA top+1
1060 LDA &12
1070 JSR hex
1080 LDA digit
1090 STA top+2
1100 LDA digit+1
1110 STA top+3
1120 RTS
1130 :
1140 .hex
1150 PHA
1160 LSR A:LSR A
1170 LSR A:LSR A
1180 JSR get
1190 STA digit
1200 PLA
1210 AND #15
1220 JSR get
1230 STA digit+1
1240 RTS
1250 :
1260 .letter
1270 CLC
1280 ADC #7
1290 .number
1300 CLC
1310 ADC #48
1320 JMP finishget
1330 :
1340 .get
1350 CMP #10
1360 BCC number
1370 JMP letter
1380 .finishget
1390 RTS
1400 :
1410 .starcom
1420 EQUS ("SAVE ")
1430 .fname
1440 EQUS (STRING$(10," "))
1450 EQUB (32)
1460 .page
1470 EQUW (0)
1480 EQUW (0)
1490 EQUB (32)
1500 .top
1510 EQUW (0)
1520 EQUW (0)
1530 EQUS (" FFFF802B FFFF")
1540 EQUS (norm$)
1550 EQUB (13)
1560 .save
1570 LDX #starcom MOD 256
1580 LDY #starcom DIV 256
1590 JSR oscli
1600 RTS
1610 ]
1620 NEXT
1630 ENDPROC
1640 :
1650 DEFPROCsave
1660 name$="QSave"
1670 OSCLI("SAVE "+name$+" "+STR$~start
+" +1FF")
1680 ENDPROC
1690 :
1700 DEFPROCchecksum
1710 I%=0
1720 FOR M%=start TO P%-1
1730 I%=I%+?M%
1740 NEXT
1750 IF I%=24493 ENDPROC
1760 VDU 7
1770 PRINT "Error in Code"
1780 PRINT "Discrepancy :";ABS(24493-I%
)
1790 END
```

PLOTTERS

Listing 1

```
10 REM VDU - HPGL translator
20 REM by David Janda
30 REM for B/B+/E/M/C
40 REM (c) BAU Nov 90
50 :
60 MODE 7
70 CH%=0
80 file$=FNgetfile
90 X1%=0 : X2%=0 : X3%=0
100 Y1%=0 : Y2%=0 : Y3%=0
110 GBC%=0 : GFC%=7 : CP%=-1
120 GWXL%=0 : GWXR%=1279
130 GWYB%=0 : GWYT%=1023
140 IP1X%=0 : IP1Y%=0
150 IP2X%=1280 : IP2Y%=1024
160 CSW=0.036 : CSH=0.072
170 WX1%=0 : WY1%=0
180 WX2%=1280 : WY2%=1024
190 PPX1%=1E9 : PPY1%=1E9
200 PH%=8 : SPO%=0
210 :
220 PROCsetup
230 CH%=OPENUP(file$)
240 REPEAT
250 BYTE%=BGET#CH%
260 IF BYTE%>31 AND BYTE%<127 THEN PRO
Cchar
270 IF BYTE%=&01 THEN PROCnodo(1)
280 IF BYTE%=&10 THEN PROCclg
290 IF BYTE%=&11 THEN PROCnodo(1)
300 IF BYTE%=&12 THEN PROCvdu18
310 IF BYTE%=&13 THEN PROCnodo(5)
320 IF BYTE%=&16 THEN PROCnodo(1)
330 IF BYTE%=&17 THEN PROCnodo(9)
340 IF BYTE%=&18 THEN PROCnodo(8)
350 IF BYTE%=&19 THEN PROCplot
360 IF BYTE%=&1A THEN PROCdefault
370 IF BYTE%=&1C THEN PROCnodo(4)
380 IF BYTE%=&1D THEN PROCorigin
390 IF BYTE%=&1F THEN PROCnodo(2)
400 UNTIL EOF#CH%
410 CLOSE#CH%
420 C$="SP0;"
430 PROCcommand
440 IF SPO%=1 THEN *SPOOL
450 PRINT : PRINT CHR$(7);"VDU - HPGL
translation complete"
460 END
470 :
480 DEF PROCplot
490 LOCAL o%,tx%,ty%,g%
500 o%=BGET#CH%
510 g%=o% MOD 8
520 X3%=X2% : X2%=X1% : tx%=FNxval
530 Y3%=Y2% : Y2%=Y1% : ty%=FNyval
540 IF g%<4 THEN g%=g%+4 : X1%=X1%+tx%
 : Y1%=Y1%+ty% : ELSE X1%=tx% : Y1%=ty%
550 IF g%=4 THEN PROCnotimp : GOTO 720
560 IF g%=5 AND CP%<>GFC% THEN PROCcha
ngeFC
570 IF g%=7 AND CP%<>GBC% THEN PROCcha
ngeBC
580 :
590 IF o%>-1 AND o%<&40 THEN PROCline
: GOTO 720
600 IF o%>&3F AND o%<&48 THEN PROCpoin
t : GOTO 720
610 IF o%>&5F AND o%<&68 THEN PROCrect
angle : GOTO 720
620 IF o%>&4F AND o%<&58 THEN PROCtria
ngle(X3%,Y3%,X2%,Y2%,X1%,Y1%)
630 IF o%>&8F AND o%<&98 THEN PROCcirc
out : GOTO 720
640 IF o%>&97 AND o%<&A0 THEN PROCcirc
le : GOTO 720
650 IF o%>&9F AND o%<&A8 THEN PROCarc
: GOTO 720
660 IF o%>&AF AND o%<&B8 THEN PROCsect
or : GOTO 720
670 IF o%>&A7 AND o%<&B0 THEN PROCsegm
ent : GOTO 720
680 IF o%>&BF AND o%<&C8 THEN PROCelli
pse(X3%,Y3%,X2%,Y2%,X1%,Y1%,0) : GOTO 72
0
690 IF o%>&C7 AND o%<&D0 THEN PROCelli
pse(X3%,Y3%,X2%,Y2%,X1%,Y1%,1) : GOTO 72
0
700 IF o%>&6F AND o%<&78 THEN PROCpara
llelogram(X3%,Y3%,X2%,Y2%,X1%,Y1%) : GOT
O 720
710 PROCnotimp
720 ENDPROC
730 :
740 DEF PROCvdu18
750 LOCAL pm%,c%,t%
760 pm%=BGET#CH%
770 c%=BGET#CH%
780 t%=c% MOD PH%
790 IF c%>127 THEN GBC%=t%
800 IF c%<128 THEN GFC%=t%
810 ENDPROC
820 :
830 DEF PROCclg
840 IF CP%=GBC% THEN GOTO 860
850 PROCchangeBC
860 C$="PA"+STR$(GWXL%)+","+STR$(GWYB%
)+";"
870 C$="RA"+STR$(GWXR%)+","+STR$(GWYT%
)+";"
880 PROCcommand
890 ENDPROC
900 :
910 DEF PROCnodo(no%)
920 LOCAL l%,d%
930 FOR l%=1 TO no%
940 d%=BGET#CH%
950 NEXT l%
960 ENDPROC
970 :
980 DEF PROCorigin
990 LOCAL xorig%,yorig%
1000 xorig%=FNxval
1010 yorig%=FNyval
1020 IF xorig%>0 THEN xorig%=xorig%-(xo
rig%*2)
1030 IF yorig%>0 THEN yorig%=yorig%-(yo
rig%*2)
1040 C$="SC"+STR$(xorig%)+","+STR$(xori
g%+1279)+","+STR$(yorig%)+","+STR$(yorig
%+1023)+";"
1050 PROCcommand
1060 ENDPROC
1070 :
1080 DEF PROCdefault
1090 C$="SC0,1279,0,1023;"
1100 C$=C$+"IW"+STR$(IP1X%)+","+STR$(IP
1Y%)+","+STR$(IP2X%)+","+STR$(IP2Y%)+";"
1110 PROCcommand
1120 X1%=0 : X2%=0 : X3%=0
1130 Y1%=0 : Y2%=0 : Y3%=0
1140 ENDPROC
1150 :
1160 DEF PROCsetup
1170 INPUT "Scale 1 - 20 ";SC%
1180 IF SC%<1 OR SC%>20 THEN GOTO 1170
1190 IP2X%=IP2X%*SC% : IP2Y%=IP2Y%*SC%
1200 CSW=CSW*SC% : CSH=CSH*SC%
1210 WX2%=WX2%*SC% : WY2%=WY2%*SC%
1220 PRINT "X=";0.0025*SC%*1280;"cm Y="
;0.0025*SC%*1024;"cm"
1230 C$="IN;"
1240 C$=C$+"IP"+STR$(IP1X%)+","+STR$(IP
1Y%)+","+STR$(IP2X%)+","+STR$(IP2Y%)+";"
1250 C$=C$+"SC"+STR$(GWXL%)+","+STR$(GW
XR%)+","+STR$(GWYB%)+","+STR$(GWYT%)+";"
1260 C$=C$+"IW"+STR$(WX1%)+","+STR$(WY1
%)+","+STR$(WX2%)+","+STR$(WY2%)+";"
1270 INPUT "Enter pen thickness 0.1 to
5.0 ";PT
1280 IF PT<0.1 OR PT>5 THEN GOTO 1270
1290 C$=C$+"PT"+STR$(PT)+";"
1300 PRINT : INPUT "Enter pen velocity
1 to 42 cm/sec ";VS%
1310 IF VS%<1 OR VS%>42 THEN GOTO 1300
1320 INPUT "Spool HPGL commands Y/N ";A
$
1330 IF A$="Y" OR A$="y" THEN SPO%=1 :
*SPOOL HPGLASC
1340 PRINT
1350 C$=C$+"VS"+STR$(VS%)+";"
1360 C$=C$+"FT1;"
1370 C$=C$+"SI"+STR$(CSW)+","+STR$(CSH)
+";"
1380 C$=C$+"PA0,0;"
1390 PROCcommand
1400 ENDPROC
1410 :
1420 DEF FNgetfile
1430 LOCAL file$,tempch%
1440 REPEAT
1450 INPUT "Name of *SPOOL file ";file$
1460 tempch%=OPENUP(file$)
1470 IF tempch%=0 THEN PRINT file$;" no
t found"
1480 CLOSE#tempch%
1490 UNTIL tempch%<>0
1500 =file$
1510 :
1520 DEF FNxval
1530 LOCAL byte%
1540 byte%=BGET#CH%+BGET#CH%*256
1550 IFbyte%>32767 THEN=byte%-&10000 EL
SE=byte%
1560 :
1570 DEF FNyval
1580 LOCAL byte%
1590 byte%=BGET#CH%+BGET#CH%*256
1600 IFbyte%>32767 THEN=byte%-&10000 EL
SE=byte%
1610 :
1620 DEF PROCerror
1630 CLS
1640 CLOSE#0
1650 VDU 7
```

Continued ▶

PLOTTERS

```
 1660 C$="SP0;"
 1670 PROCcommand
 1680 IF SPO%=1 THEN *SPOOL
 1690 REPORT
 1700 PRINT ;" at line ";ERL
 1710 ENDPROC
 1720 :
 1730 DEF PROCcommand
 1740 IF SPO%=0 THEN VDU 2
 1750 PRINT C$
 1760 IF SPO%=0 THEN VDU 3
 1770 C$=""
 1780 ENDPROC
 1790 :
 1800 DEF PROCchar
 1810 C$="PA"+STR$(X1%)+","+STR$((Y1%-32)) : PROCcommand
 1820 IF SPO%=1 THEN PRINT "LB"+CHR$(BYTE%)+CHR$(3); : GOTO 1860
 1830 VDU 2 : PRINT "LB"+CHR$(BYTE%)
 1840 VDU 1 : PRINT CHR$(3)
 1850 VDU 3
 1860 X3%=X2% : X2%=X1% : X1%=X1%+16
 1870 Y3%=Y2% : Y2%=Y1% : Y1%=Y1%
 1880 C$="PU;PA"+STR$(X1%)+","+STR$(Y1%)+";"
 1890 PROCcommand
 1900 ENDPROC
 1910 :
 1920 DEF PROCchangeFC
 1930 C$="SP"+STR$(GFC%+1)+";"
 1940 PROCcommand
 1950 CP%=GFC%
 1960 ENDPROC
 1970 :
 1980 DEF PROCchangeBC
 1990 C$="SP"+STR$(GBC%+1)+";"
 2000 PROCcommand
 2010 CP%=GBC%
 2020 ENDPROC
 2030 :
 2040 DEF PROCline
 2050 IF X1%=X2% AND Y1%=Y2% THEN 2080
 2060 C$="PD"+STR$(X1%)+","+STR$(Y1%)+";"
 2070 PROCcommand
 2080 ENDPROC
 2090 :
 2100 DEF PROCpoint
 2110 IF PPX1%=X1% AND PPY1%=Y1% THEN GOTO 2150
 2120 IF ABS(X1%-X2%)=1 AND ABS(Y1%-Y2%)=1 THEN C$="PA"+STR$(X1%)+","+STR$(Y1%)+";PD;" : PROCcommand : GOTO 2150
 2130 C$="PU"+STR$(X1%)+","+STR$(Y1%)+";PD;"
 2140 PROCcommand
 2150 PPX1=X1% : PPY1=Y1%
 2160 ENDPROC
 2170 :
 2180 DEF PROCnotimp
 2190 C$="PU;PA"+STR$(X1%)+","+STR$(Y1%)+";"
 2200 PROCcommand
 2210 ENDPROC
 2220 :
 2230 DEF PROCtriangle(X1,Y1,X2,Y2,X3,Y3)
 2240 LOCAL P1X,P2X,P3X,P1Y,P2Y,P3Y
 2250 LOCAL SL,LL,SLS,LLS,L1,L2,C
 2260 IF X1=X2 AND X1<X3 THEN P1X=X1 : P1Y=Y1 : P2X=X2 : P2Y=Y2 : P3X=X3 : P3Y=Y3 : GOTO 2440
 2270 IF X1=X3 AND X1<X2 THEN P1X=X1 : P1Y=Y1 : P2X=X3 : P2Y=Y3 : P3X=X2 : P3Y=Y2 : GOTO 2440
 2280 IF X2=X3 AND X2<X1 THEN P1X=X2 : P1Y=Y2 : P2X=X3 : P2Y=Y3 : P3X=X1 : P3Y=Y1 : GOTO 2440
 2290 IF X1=X2 AND X1>X3 THEN P1X=X3 : P1Y=Y3 : P2X=X1 : P2Y=Y1 : P3X=X2 : P3Y=Y2 : GOTO 2440
 2300 IF X1=X3 AND X1>X2 THEN P1X=X2 : P1Y=Y2 : P2X=X1 : P2Y=Y1 : P3X=X3 : P3Y=Y3 : GOTO 2440
 2310 IF X2=X3 AND X2>X1 THEN P1X=X1 : P1Y=Y1 : P2X=X2 : P2Y=Y2 : P3X=X3 : P3Y=Y3 : GOTO 2440
 2320 P1X=1E9
 2330 IF X1<P1X THEN P1X=X1 : P1Y=Y1
 2340 IF X2<P1X THEN P1X=X2 : P1Y=Y2
 2350 IF X3<P1X THEN P1X=X3 : P1Y=Y3
 2360 P3X=-1E9
 2370 IF X1>P1X THEN P3X=X1 : P3Y=Y1
 2380 IF X2>P3X THEN P3X=X2 : P3Y=Y2
 2390 IF X3>P3X THEN P3X=X3 : P3Y=Y3
 2400 P2X=-1E9
 2410 IF X1>P1X AND X1<P3X THEN P2X=X1 : P2Y=Y1
 2420 IF X2>P1X AND X2<P3X THEN P2X=X2 : P2Y=Y2
 2430 IF X3>P1X AND X3<P3X THEN P2X=X3 : P2Y=Y3
 2440 SL=(P2X-P1X)+1
 2450 LL=(P3X-P1X)+1
 2460 IF P2Y-P1Y=0 THEN SLS=0 ELSE SLS=(P2Y-P1Y)/SL
 2470 IF P3Y-P1Y=0 THEN LLS=0 ELSE LLS=(P3Y-P1Y)/LL
 2480 L1=P1Y
 2490 L2=P1Y
 2500 C$="PU;PA"+STR$(P1X)+","+STR$(L1)+";"
 2510 FOR C=P1X TO P2X
 2520 C$="PD;PA"+STR$(C)+","+STR$(L1)+";"
 2530 C$=C$+"PD;PA"+STR$(C)+","+STR$(L2)+";"
 2540 PROCcommand
 2550 L1=L1+SLS
 2560 L2=L2+LLS
 2570 NEXT C
 2580 SL=(P3X-P2X)+1
 2590 IF P3Y-P2Y=0 THEN SLS=0 ELSE SLS=(P3Y-P2Y)/SL
 2600 FOR C=P2X TO P3X
 2610 C$="PD;PA"+STR$(C)+","+STR$(L1)+";"
 2620 PROCcommand
 2630 C$=C$+"PD;PA"+STR$(C)+","+STR$(L2)+";"
 2640 PROCcommand
 2650 L1=L1+SLS
 2660 L2=L2+LLS
 2670 NEXT C
 2680 :
 2690 C$="PU;PA"+STR$(X3)+","+STR$(Y3)+";"
 2700 PROCcommand
 2710 C$="PD;PA"+STR$(X2)+","+STR$(Y2)+";"
 2720 PROCcommand
 2730 C$="PA"+STR$(X1)+","+STR$(Y1)+";"
 2740 PROCcommand
 2750 C$="PA"+STR$(X3)+","+STR$(Y3)+";"
 2760 PROCcommand
 2770 C$="PU;PA"+STR$(X1%)+","+STR$(Y1%)+";"
 2780 PROCcommand
 2790 ENDPROC
 2800 :
 2810 DEF PROCrectangle
 2820 C$="PU;PA"+STR$(X2%)+","+STR$(Y2%)+";"
 2830 PROCcommand
 2840 C$="RA"+STR$(X1%)+","+STR$(Y1%)+";"
 2850 PROCcommand
 2860 ENDPROC
 2870 :
 2880 DEF PROCcircout
 2890 LOCAL lx%,ly%,len%
 2900 lx%=ABS(X2%-X1%)
 2910 ly%=ABS(Y2%-Y1%)
 2920 len%=SQR((lx%*lx%)+(ly%*ly%))
 2930 C$="PA"+STR$(X2%)+","+STR$(Y2%)+";"
 2940 PROCcommand
 2950 C$="CI"+STR$(len%)+",0;"
 2960 PROCcommand
 2970 C$="PA"+STR$(X1%)+","+STR$(Y1%)+";"
 2980 PROCcommand
 2990 ENDPROC
 3000 :
 3010 DEF PROCcircle
 3020 LOCAL len%,lx%,ly%
 3030 lx%=ABS(X2%-X1%)
 3040 ly%=ABS(Y2%-Y1%)
 3050 len%=SQR(lx%*lx%+ly%*ly%)
 3060 C$="PA"+STR$(X2%)+","+STR$(Y2%)+";"
 3070 PROCcommand
 3080 C$="WG"+STR$(len%)+",0,360,4;"
 3090 PROCcommand
 3100 PROCcircout
 3110 C$="PU;PA"+STR$(X1%)+","+STR$(Y1%)+";"
 3120 PROCcommand
 3130 ENDPROC
 3140 :
 3150 DEF PROCarccalc
 3160 LOCAL A,B,C,D,R2,cos1,sin1,tan1,cos2,sin2,tan2
 3170 XC=X3% : YC=Y3%
 3180 X1=X2% : Y1=Y2%
 3190 X2=X1% : Y2=Y1%
 3200 A=X1-XC : B=Y1-YC : C=X2-XC : D=Y2-YC : R=SQR(A*A+B*B) : R2=SQR(C*C+D*D)
 3210 cos1=ACS(A/R) : sin1=ASN(B/R)
 3220 IF A<>0 THEN tan1=ATN(B/A) : GOTO 3230 ELSE IF B<0 THEN tan1=-1 ELSE tan1=1
 3230 cos2=ACS(C/R2) : sin2=ASN(D/R2)
 3240 IF C<>0 THEN tan2=ATN(D/C) : GOTO 3250 ELSE IF D<0 THEN tan2=-1 ELSE tan2=1
 3250 ang1=DEG(cos1)
 3260 IF sin1>0 AND cos1<0 AND tan1<0 THEN ang1=180-ang1
 3270 IF tan1>0 AND sin1<0 AND cos1<0 THEN ang1=180+ang1
 3280 IF tan1>0 AND cos1>0 AND sin1<0 THEN ang1=360-ang1
 3290 IF cos1>0 AND sin1<0 AND tan1<0 THEN ang1=360-ang1
 3300 ang2=DEG(cos2)
 3310 IF sin2>0 AND cos2<0 AND tan2<0 THEN ang2=180-ang2
 3320 IF tan2>0 AND sin2<0 AND cos2<0 THEN ang2=180+ang2
 3330 IF tan2>0 AND cos2>0 AND sin2<0 THEN ang2=360-ang2
 3340 IF cos2>0 AND sin2<0 AND tan2<0 THEN ang2=360-ang2
 3350 a=ang2-ang1 : IF a<0 THEN a=360+a
 3360 REM XC,YC = centre
 3370 REM X1,Y1 = start position
 3380 REM R = radius
 3390 REM ang1 = start angle (from horiz)
 3400 REM ang2 = end angle (from horiz)
 3410 REM a = angle turned from start
 3420 ENDPROC
 3430 :
 3440 DEF PROCarc
 3450 PROCarccalc
 3460 C$="PA"+STR$(X1)+","+STR$(Y1)+";"
 3470 PROCcommand
 3480 C$="PD;AA"+STR$(XC)+","+STR$(YC)+","+STR$(a)+",0;PU;"
 3490 PROCcommand
 3500 C$="PA"+STR$(X3%)+","+STR$(Y3%)+";"
 3510 PROCcommand
 3520 ENDPROC
 3530 :
 3540 DEF PROCsector
 3550 PROCarccalc
 3560 C$="PA"+STR$(XC)+","+STR$(YC)+";"
 3570 PROCcommand
 3580 C$="PD;WG"+STR$(R)+","+STR$(ang1)+","+STR$(a)+",4;PU;"
 3590 PROCcommand
 3600 C$="PA"+STR$(XC)+","+STR$(YC)+";"
 3610 PROCcommand
 3620 C$="PD;EW"+STR$(R)+","+STR$(ang1)+","+STR$(a)+",4;PU;"
 3630 PROCcommand
 3640 C$="PA"+STR$(X1%)+","+STR$(Y1%)+";"
 3650 PROCcommand
 3660 ENDPROC
 3670 :
 3680 DEF PROCsegment
 3690 PROCarccalc
 3700 S=(180/(R*2))
 3710 REPEAT
 3720 X1=XC+R*COS(RAD(ang1))
 3730 Y1=YC+R*SIN(RAD(ang1))
 3740 X2=XC+R*COS(RAD(ang2))
 3750 Y2=YC+R*SIN(RAD(ang2))
 3760 C$="PA"+STR$(X1)+","+STR$(Y1)+";PD;"
 3770 PROCcommand
 3780 C$="PA"+STR$(X2)+","+STR$(Y2)+";PD;"
 3790 PROCcommand
 3800 ang1=ang1+S : ang2=ang2-S
 3810 IF ang1<0 THEN ang1=ang1+360
 3820 IF ang2<0 THEN ang2=ang2+360
 3830 UNTIL ABS(ang1-ang2)<1
 3840 PROCarccalc
 3850 C$="PA"+STR$(X1)+","+STR$(Y1)+";"
 3860 PROCcommand
 3870 C$="AA"+STR$(XC)+","+STR$(YC)+","+STR$(a)+",0;"
 3880 PROCcommand
 3890 C$="PA"+STR$(X2%)+","+STR$(Y2%)+";"
 3900 PROCcommand
 3910 C$="PU;PA"+STR$(X1%)+","+STR$(Y1%)+";"
 3920 PROCcommand
 3930 ENDPROC
 3940 :
 3950 DEF PROCellipse(XC,YC,X1,Y1,X2,Y2,fill)
 3960 LOCAL A,B,C,major,theta,sin,cos,minor,cost,sint,major1,minor1,circ,X1%,Y1%,X2%,Y2%
 3970 A=Y2-YC
 3980 B=X2-XC
 3990 C=X1-XC
 4000 major=SQR(A^2+B^2)
 4010 IF B=0 THEN theta=PI/2 ELSE theta=ATN(A/B)
 4020 sin=SIN(theta) : cos=COS(theta)
 4030 minor=SQR((major*sin)^2/((major^2/C^2)-cos^2))
 4040 :
 4050 cost = COS theta
 4060 sint = SIN theta
 4070 major1 = major
 4080 minor1 = minor
 4090 REPEAT
 4100 FOR circ=0 TO 2 * PI STEP PI/major1
 4110 X1% = major1 * COS circ
 4120 Y1% = minor1 * SIN circ
 4130 X2% = X1% * cost - Y1% * sint
 4140 Y2% = X1% * sint + Y1% * cost
 4150 C$="PA"+STR$(XC+X2%)+","+STR$(YC+Y2%)+";PD;"
 4160 PROCcommand
 4170 NEXT circ
 4180 major1 = major1 - 2
 4190 minor1 = minor1 - 2 * minor / major
 4200 UNTIL major1 <= 0 OR fill=0
 4210 C$="PU;PA"+STR$(X2)+","+STR$(Y2)+";"
 4220 PROCcommand
 4230 ENDPROC
 4240 :
 4250 DEF PROCparallelogram(P3PX,P3PY,P2PX,P2PY,P1PX,P1PY)
 4260 LOCAL t
 4270 P4PX=ABS(P3PX+P1PX)-P2PX
 4280 P4PY=ABS(P3PY+P1PY)-P2PY
 4290 PROCtriangle(P3PX,P3PY,P2PX,P2PY,P1PX,P1PY)
 4300 PROCtriangle(P3PX,P3PY,P1PX,P1PY,P4PX,P4PY)
 4310 C$="PU;PA"+STR$(P1PX)+","+STR$(P1PY)+";"
 4320 ENDPROC
```

PICPAC

Listing 1

```
   10 REM Draw Menu Screen
   20 REM PicPac Listing 1
   30 REM by James Richards
   40 REM for B/B+/M/C/E
   50 REM (c) BBC Acorn User November 1990
   60 :
   70 ON ERROR MODE 0:PROCerror
   80 MODE4
   90 PROCdefine
  100 VDU23;8202;0;0;0;
  110 PROCscreen(170,85)
  120 COLOUR129
  130 COLOUR0
  140 PROCwindow(3,16,22,3)
  150 PROCwindow(25,6,33,3)
  160 PROCwindow(25,12,33,9)
  170 PROCwindow(25,19,33,15)
  180 PROCwindow(26,27,35,23)
  190 PROCwindow(4,24,10,20)
  200 PROCwindow(14,24,22,20)
  210 PRINTTAB(5,4);"Functions"
  220 PRINTTAB(4,14);"Click here to"
  230 PRINTTAB(4,15);"Set User Icon"
  240 PRINTTAB(5,21);"Mode"
  250 PRINTTAB(15,21);"Printer"
  260 PRINTTAB(16,22);"Dump"
  270 PRINTTAB(29,24);"Time"
  280 PRINTTAB(26,16);"Partial"
  290 PRINTTAB(26,17);"Screen"
  300 PRINTTAB(27,18);"Save"
  310 PRINTTAB(26,4);"Examine"
  320 PRINTTAB(26,5);"Picture"
  330 PRINTTAB(27,10);"Star"
  340 PRINTTAB(26,11);"Command"
  350 :
  360 FOR x%=32 TO 64 STEP4
  370 GCOL0,0
  380 :
  390 MOVE x%,x%+100
  400 DRAW x%,1023-x%
  410 DRAW 1279-x%,1023-x%
  420 :
  430 GCOL 0,1
  440 DRAW 1279-x%,x%
  450 DRAW x%+740,x%
  460 :
  470 GCOL0,0
  480 DRAW x%+740,x%+100
  490 :
  500 GCOL0,1
  510 DRAW x%,x%+100
  520 NEXT
  530 MOVE 32,991
  540 :
  550 GCOL0,1
  560 PLOT 22,64,959
  570 MOVE 32,132
  580 DRAW 32,991
  590 DRAW 1247,991
```

PICPAC

◀ Continued

```
600 :
610 GCOL0,0
620 DRAW 1247,32
630 DRAW 772,32
640 :
650 GCOL0,1
660 DRAW 772,132
670 :
680 GCOL0,0
690 DRAW 32,132
700 MOVE 1247,32
710 :
720 GCOL0,0
730 PLOT 22,1215,64
740 :
750 GCOL0,1
760 MOVE 16,16
770 DRAW 16,116
780 DRAW 756,116
790 :
800 GCOL0,0
810 DRAW 756,16
820 DRAW 16,16
830 :
840 GCOL0,0
850 MOVE 1251,987
860 DRAW 1251,32
870 VDU5
880 FOR y%=100 TO 88 STEP-4
890 FOR x%=136 TO 148 STEP4
900 MOVE x%,y%
910 IF y%=100 THEN GCOL0,1 ELSE GCOL0,0
920 PRINT"PicPac Version 1"
930 NEXT
940 NEXT
950 :
960 GCOL0,1
970 MOVE 146,92
980 PRINT"PicPac Version 1"
990 GCOL0,0
1000 FOR y%=56 TO 48 STEP-4
1010 FOR x%=112 TO 128 STEP4
1020 MOVE x%,y%
1030 PRINT"By James Richards."
1040 NEXT
1050 NEXT
1060 :
1070 GCOL0,1
1080 MOVE 122,52
1090 PRINT"By James Richards."
1100 VDU4
1110 PROCicons
1120 PROCsetupdisc
1130 *SA."$.4.Menupic" 5800 8000
1140 MODE 4
1150 PRINT'''"PicPac is now on the disc"
1160 PRINT"Please type :-"
1170 PRINT''"*BUILD !Boot"
1180 PRINT'"*DIR $.PicPac"
1190 PRINT'"CHAIN""Init"""
1200 PRINT'"And then press ESCAPE."
1210 END
1220 :
1230 DEF PROCwindow(x%,y%,x1%,y1%)
1240 COLOUR128
1250 VDU28,x%+1,y%+1,x1%+1,y1%+1
1260 CLS
1270 VDU26
1280 VDU28,x%,y%,x1%,y1%
1290 COLOUR129
1300 CLS
1310 GCOL0,0
1320 x%=x%*32
1330 y%=(31-y%)*32
1340 x1%=(x1%+1)*32
1350 y1%=(31-y1%+1)*32
1360 MOVE x%,y%
1370 DRAW x1%,y%
1380 DRAW x1%,y1%
1390 DRAW x%,y1%
1400 DRAW x%,y%
1410 VDU26
1420 ENDPROC
1430 :
1440 DEF PROCscreen(byte1%,byte2%)
1450 ?&72=byte1%
1460 ?&73=byte2%
1470 DIM Q% 100
1480 FOR pass=0 TO 2 STEP2
1490 P%=Q%
1500 [OPT pass
1510 .init
1520 LDA #&58
1530 STA &71
1540 LDA #&00
1550 STA &70
1560 LDY #&00
1570 .loop
1580 LDA &72
1590 STA (&70),Y
1600 INC &70
1610 LDA &73
1620 STA (&70),Y
1630 INC &70
1640 LDA #&00
1650 CMP &70
1660 BNE loop
1670 INC &71
1680 LDA #&80
1690 CMP &71
1700 BNE loop
1710 RTS
1720 ]
1730 NEXT
1740 CALL init
1750 ENDPROC
1760 :
1770 DEF PROCdefine
1780 *FX20,0
1790 *FX20,1
1800 *FX20,2
1810 *FX20,3
1820 :
1830 REM ** Circle Icon **
1840 :
1850 VDU 23,128,0,7,24,32,32,64,64,64
1860 VDU 23,129,0,224,24,4,4,2,2,2
1870 VDU 23,130,64,64,64,32,32,24,7,0
1880 VDU 23,131,2,2,2,4,4,24,224,0
1890 :
1900 REM  ** Copy Icon **
1910 :
1920 VDU 23,132,1,121,1,1,113,137,217,137
1930 VDU 23,133,128,158,128,128,142,145,155,145
1940 VDU 23,134,169,113,1,69,109,85,69,1
1950 VDU 23,135,149,142,128,162,182,170,162,128
1960 :
1970 REM ** Disc Icon **
1980 :
1990 VDU 23,136,255,252,196,196,252,129,130,154
2000 VDU 23,137,255,1,1,3,2,195,33,161
2010 VDU 23,138,154,129,128,128,128,128,128,255
2020 VDU 23,139,33,193,1,193,193,193,1,255
2030 :
2040 REM ** Draw Icon **
2050 :
2060 VDU 23,140,8,52,82,97,130,68,42,17
2070 VDU 23,141,0,0,0,0,128,64,160,16
2080 VDU 23,142,10,4,2,1,0,0,0,0
2090 VDU 23,143,8,4,6,10,146,122,62,0
2100 :
2110 REM ** End Icon **
2120 :
2130 VDU 23,144,0,0,0,0,58,35,50,34
2140 VDU 23,145,0,0,0,0,92,82,210,210
2150 VDU 23,146,58,0,0,0,0,0,0,0
2160 VDU 23,147,92,0,0,0,0,0,0,0
2170 :
2180 REM ** Fill Icon **
2190 :
2200 VDU 23,148,0,3,28,32,35,62,62,61
2210 VDU 23,149,24,240,56,100,100,220,220,188
2220 VDU 23,150,35,32,33,33,33,33,28,3
2230 VDU 23,151,196,4,196,68,196,4,56,192
2240 :
2250 REM ** Load Icon **
2260 :
2270 VDU 23,152,1,3,7,1,1,0,31,20
2280 VDU 23,153,128,192,224,128,128,0,248,72
2290 VDU 23,154,20,19,16,16,16,23,20,31
2300 VDU 23,155,72,136,8,8,8,232,40,248
2310 :
2320 REM ** Save Icon **
2330 :
2340 VDU 23,156,1,1,1,7,3,1,0,31
2350 VDU 23,157,128,128,128,224,192,128,0,248
2360 VDU 23,158,20,20,19,16,16,23,20,31
2370 VDU 23,159,72,72,136,8,8,232,40,248
2380 :
2390 REM ** Text Icon **
2400 :
2410 VDU 23,160,192,224,208,240,104,56,52,26
2420 VDU 23,161,0,0,0,0,0,0,0,0
2430 VDU 23,162,206,6,1,32,68,248,16,32
2440 VDU 23,163,255,0,128,135,72,62,32,126
2450 :
2460 REM ** User Icon **
2470 :
2480 VDU 23,164,3,15,31,62,60,0,0,1
2490 VDU 23,165,192,240,248,124,60,124,248,240
2500 VDU 23,166,3,3,3,0,3,3,3,0
2510 VDU 23,167,224,192,192,0,192,192,192,0
2520 :
2530 ENDPROC
2540 :
2550 DEF PROCicons
2560 PROCprint(4,7,128)
2570 PROCprint(8,7,132)
2580 PROCprint(12,7,136)
2590 PROCprint(16,7,140)
2600 PROCprint(20,7,164)
2610 PROCprint(4,11,144)
2620 PROCprint(8,11,148)
2630 PROCprint(12,11,152)
2640 PROCprint(16,11,156)
2650 PROCprint(20,11,160)
2660 PRINTTAB(19,14);
2670 COLOUR 128
2680 VDU 32,32,32
2690 VDU 8,8,8,10
2700 VDU 32,32,32
2710 ENDPROC
2720 :
2730 DEF PROCprint(x%,y%,start%)
2740 PRINTTAB(x%,y%);
2750 VDU start%,start%+1
2760 VDU 8,8,10
2770 VDU start%+2,start%+3
2780 cx%=(x%*32)-8
2790 cy%=((32-y%)*32)+8
2800 cx1%=((x%*32)+64)+8
2810 cy1%=(((32-y%)*32)-64)-8
2820 GCOL0,0
2830 MOVE cx%,cy%
2840 DRAW cx1%,cy%
2850 DRAW cx1%,cy1%
2860 DRAW cx%,cy1%
2870 DRAW cx%,cy%
2880 ENDPROC
2890 :
2900 DEF PROCsetupdisc
2910 FOR loop%=0 TO 5
2920 IF loop%=3 THEN NEXT
2930 OSCLI "CDIR "+STR$(loop%)
2940 IF loop%<3 THEN himem%=&3000 ELSE himem%=&5800
2950 OSCLI "SAVE $."+STR$(loop%)+".wkfile "+STR$~(himem%)+" "+STR$~(himem%)
2960 NEXT
2970 *CDIR $.Picpac
2980 *CDIR $.UserProgs
2990 ENDPROC
3000 :
3010 DEF PROCerror
3020 PRINT'''
3030 REPORT:PRINT;" at line ";ERL
3040 END
```

Listing 2

```
10 REM Menu Program
20 REM PicPac Listing 2
30 REM By James Richards
40 REM for B/B+/M/C/E
50 REM (c) BBC Acorn User November 1990
60 :
70 MODE4
80 ON ERROR PROCerr
90 PROCinit
100 *LOAD $.4.MENUPIC 5800
110 PRINTTAB(7,23);M%
120 REPEAT
130 PROCprint
140 left%=FALSE
150 right%=FALSE
160 up%=FALSE
170 down%=FALSE
180 k%=FALSE
190 IF INKEY(-98) THEN left%=TRUE:k%=TRUE
200 IF INKEY(-67) THEN right%=TRUE:k%=TRUE
210 IF INKEY(-73) THEN up%=TRUE:k%=TRUE
220 IF INKEY(-105) THEN down%=TRUE:k%=TRUE
230 IF INKEY(-74) THEN PROCtranslate
240 IF k%=FALSE THEN 140
250 PROCprint
260 IF left%=TRUE THEN x%=x%-32
270 IF right%=TRUE THEN x%=x%+32
280 IF up%=TRUE THEN y%=y%+32
290 IF down%=TRUE THEN y%=y%-32
300 IF x%<0 THEN x%=0
310 IF x%>1247 THEN x%=1247
320 IF y%<32 THEN y%=32
330 IF y%>1023 THEN y%=1023
340 UNTIL FALSE
350 :
360 DEF PROCprint
370 MOVE x%,y%
380 GCOL4,0
390 VDU5,224,4
400 ENDPROC
410 :
420 DEF PROCinit
430 VDU26
440 VDU23;8202;0;0;0;
450 VDU23,224,&C0,&F0,&6C,&50,&28,&24,&02,&01
460 x%=640:y%=512
470 ENDPROC
480 :
490 DEF PROCtranslate
500 SOUND1,-15,100,1
510 rx%=x%
520 ry%=y%
530 x%=1+(x% DIV 32)
540 y%=32-(y% DIV 32)
550 :
560 REM * Check for super icons *
570 :
580 REM * Check for MODE icon *
590 IF x%>4 AND x%<12 AND y%<25 AND y%>19 THEN PROCmode
600 :
610 REM * Check for LOOK icon *
620 IF x%>25 AND x%<35 AND y%<7 AND y%>2 THEN PROClook
630 :
640 REM * Check for STAR icon *
650 IF x%>25 AND x%<35 AND y%<13 AND y%>8 THEN PROCstar
660 :
670 REM * Check for SAVE icon *
680 IF x%>25 AND x%<35 AND y%<20 AND y%>14 THEN PROCpartsave
690 :
700 REM * Check for PRINT icon *
710 IF x%>14 AND x%<24 AND y%<25 AND y%> 19 THEN PROCprinter
720 :
730 REM * Check for TIME icon *
740 IF x%>26 AND x%<37 AND y%<28 AND y%>22 THEN PROCtime
750 :
760 REM * Super icons checked *
770 :
780 REM * Now standard Icons *
790 :
800 IF y%>6 AND y%<10 THEN PROCchecktopline
810 IF y%>10 AND y%<14 THEN PROCcheckbottom
820 IF x%>19 AND x%<23 AND y%>13 AND y%<17 THEN CHAIN"SetUser"
830 x%=rx%
840 y%=ry%
850 :
860 ENDPROC
870 :
880 DEF PROCchecktopline
890 IF x%>4 AND x%<7 THEN PROCcurves:ENDPROC
900 IF x%>8 AND x%<11 THEN PROCcopy:ENDPROC
910 IF x%>12 AND x%<15 THEN PROCcataloge:ENDPROC
920 IF x%>16 AND x%<19 THEN PROCband:ENDPROC
930 IF x%>20 AND x%<23 THEN PROCuser:ENDPROC
940 ENDPROC
950 :
960 DEF PROCcheckbottom
970 IF x%>4 AND x%<7 THEN PROCend
980 IF x%>8 AND x%<11 THEN PROCpaint:ENDPROC
990 IF x%>12 AND x%<15 THEN PROCload:ENDPROC
1000 IF x%>16 AND x%<19 THEN PROCsave:ENDPROC
1010 IF x%>20 AND x%<23 THEN PROCtext:ENDPROC
1020 ENDPROC
1030 :
1040 DEF PROCmode
1050 M%=M%+1
1060 IF M%=3 THEN M%=M%+1
1070 IF M%>5 THEN M%=0
1080 PRINTTAB(7,23);M%
1090 NOW=TIME
1100 REPEAT UNTIL TIME-NOW=50
1110 ENDPROC
1120 :
1130 DEF PROCstar
1140 CLS
1150 CHAIN"Starcomm"
1160 :
1170 DEF PROCprinter
1180 CHAIN"PrintdM"
1190 :
1200 DEF PROCtime
1210 t%=TIME
1220 min%=(TIME DIV 100) DIV 60
1230 PRINTTAB(27,26);min%;" mins."
1240 ENDPROC
1250 :
1260 DEF PROCcatalouge
1270 CLS
1280 PRINT'''
1290 OSCLI "*CAT $."+STR$(M%)
1300 PRINT''
1310 PRINT'TAB(7);"Press a key to continue."
1320 *FX15,0
1330 REPEAT UNTIL GET
1340 RUN
1350 :
1360 DEF PROCend
1370 CALL !-4
1380 :
1390 DEF PROCband
1400 $&900="Band"
```

Continued ▶

◀ Continued

```
1410 CHAIN"Icondrive"
1420 : -
1430 DEF PROCload
1440 CHAIN"Loadscr"
1450 :
1460 DEF PROCsave
1470 CHAIN"Savescr"
1480 :
1490 DEF PROCcurves
1500 $&900="Curves"   .
1510 CHAIN"Icondrive"
1520 :
1530 DEF PROCsetuser
1540 CHAIN"Setuser"
1550 :
1560 DEF PROCuser
1570 CHAIN"Userlink"
1580 :
1590 DEF PROCpaint
1600 $&900="Fill"
1610 CHAIN"Icondrive"
1620 :
1630 DEF PROCtext
1640 $&900="Text"
1650 CHAIN"Icondrive"
1660 :
1670 DEF PROCcopy
1680 $&900="Copy"
1690 CHAIN"Icondrive"
1700 :
1710 DEF PROClook
1720 $&900="Look"
1730 CHAIN"Icondrive"
1740 :
1750 DEF PROCpartsave
1760 CHAIN"Partsave"
1770 :
1780 DEF PROCerr
1790 *FX15,0
1800 CLS
1810 PRINT''
1820 REPORT
1830 NOW=TIME
1840 REPEAT UNTIL TIME-NOW = 200
1850 PRINT''"Press Q to end program"
1860 A$=GET$
1870 IF A$="Q" THEN PROCquit ELSE RUN
1880 :
1890 DEF PROCquit
1900 PRINT''
1910 REPORT:PRINT;" at line ";ERL
1920 PRINT''
1930 OSCLI "KEY 0 LIST "+STR$(ERL)+"|M"
1940 *FX138,0,128
1950 PRINT''
1960 END
```

Listing 3

```
10 REM CHAIN string at &900
20 REM PicPac Listing 3
30 REM by James Richards
40 REM for B/B+/M/C/E
50 REM (c) BBC Acorn User November 19
90
60 :
70 *FX229,1
80 ON ERROR MODE6:PROCerror
90 MODE M%
100 PROCcoff
110 PROCload
120 PROCclearbottom
130 CHAIN $&900
140 :
150 DEF PROCload
160 OSCLI "LOAD $."+STR$(M%)+".wkfile"
170 REM If M% were 4 this line transla
tes to *LOAD $.4.wkfile 5800
180 ENDPROC
190 :
200 DEF PROCcoff
210 VDU23;8202;0;0;0;
220 ENDPROC
230 :
240 DEF PROCclearbottom
250 GCOL0,128
260 VDU24,0;0;1279;32;
270 CLG
280 VDU26
290 ENDPROC
300 :
310 DEF PROCerror
320 PRINT'''
330 *FX15,0
340 REPORT
350 PRINT;" at line ";ERL
360 OSCLI "KEY 0 LIST "+STR$(ERL)+"|M"
370 *FX 138,0,128
380 END
```

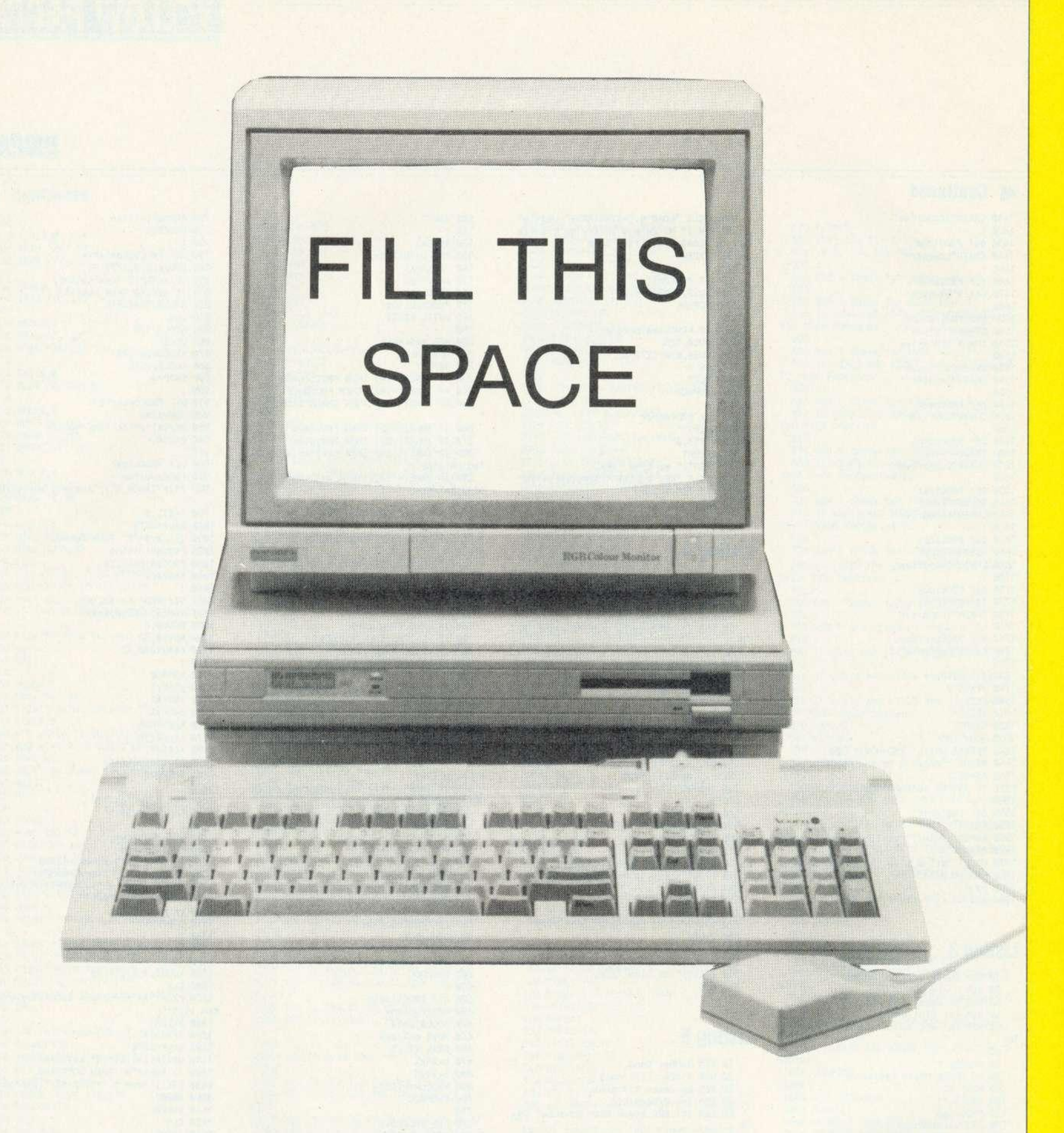
Listing 4

```
10 REM Save screen and Menu
20 REM PicPac Listing 4
30 REM by James Richards
40 REM for B/B+/M/C/E
50 REM (c) BBC Acorn User November 19
90
60 :
70 ON ERROR PROCerror
80 PROCsave
90 *FX202,128,111
100 CHAIN"Menu"
110 :
120 DEF PROCsave
130 IF M%<3 THEN himem%=&3000
140 IF M%>3 THEN himem%=&5800
150 OSCLI "SAVE $."+STR$(M%)+".wkfile
"+STR$~(himem%)+" 8000"
160 ENDPROC
170 :
180 DEF PROCerror
190 VDU26,28,0,31,19,31
200 PRINT"ERROR !!";
210 NOW=TIME
220 REPEAT UNTIL TIME-NOW>200
230 PRINT"Insert spare disc";
240 *FX15,0
250 key$=GET$
260 *MOUNT
270 OSCLI "SAVE Emergency 3000 8000"
280 VDU26
290 CLS
300 REPORT
310 PRINT;" at line ";ERL
320 END
```

Listing 5

```
10 REM Rubber Band
20 REM PicPac Listing 5
30 REM by James Richards
40 REM for B/B+/M/C/E
50 REM (c) BBC Acorn User November 19
90
60 :
80 ON ERROR PROCerror
90 PROCinitialise
100 VDU7
110 :
120 REPEAT
130 PROCprintline
140 remx%=x%
150 remy%=y%
160 PROCkeys
170 PROCrubline
180 UNTIL FALSE
190 :
200 DEF PROCkeys
210 kp%=FALSE
220 REPEAT
230 IF INKEY(-74) THEN PROClinein
240 IF INKEY(-102) THEN PROCmove
250 IF INKEY(-38) THEN CHAIN"Icondrive
"
260 IF INKEY(-55) THEN PROCsave
270 IF INKEY(-83) THEN PROCclear
280 IF INKEY(-26) THEN col%=col%-1:PRO
Cadjpalette
290 IF INKEY(-122) THEN col%=col%+1:PR
OCadjpalette
300 :
310 IF INKEY(-98) THEN x%=x%-step%:kp%
=TRUE
320 IF INKEY(-67) THEN x%=x%+step%:kp%
=TRUE
330 IF INKEY(-73) THEN y%=y%+step%:kp%
=TRUE
340 IF INKEY(-105) THEN y%=y%-step%:kp
%=TRUE
350 :
360 IF x%<0 THEN x%=0
370 IF x%>1280 THEN x%=1280
380 IF y%<36 THEN y%=36
390 IF y%>1024 THEN y%=1024
400 :
410 IF INKEY(-49) THEN step%=4:VDU7:PR
OCdelay(10)
420 IF INKEY(-50) THEN step%=8:VDU7:PR
OCdelay(10)
430 IF INKEY(-18) THEN step%=16:VDU7:P
ROCdelay(10)
440 IF INKEY(-19) THEN step%=32:VDU7:P
ROCdelay(10)
450 IF INKEY(-113) THEN PROCrubline:PR
OCfinished
460 UNTIL kp%=TRUE
480 ENDPROC
490 :
500 DEF PROCprintline
510 GCOL 3,7
520 MOVE ox%,oy%
530 DRAW x%,y%
540 ENDPROC
550 :
560 DEF PROCrubline
570 GCOL 3,7
580 MOVE ox%,oy%
590 DRAW remx%,remy%
600 ENDPROC
610 :
620 DEF PROClinein
630 PROCrubline
640 GCOL0,col%
650 MOVE ox%,oy%
660 DRAW x%,y%
670 ox%=x%
680 oy%=y%
690 PROCprintline
700 ENDPROC
710 :
720 DEF PROCmove
730 PROCrubline
740 ox%=x%
750 oy%=y%
760 PROCprintline
770 ENDPROC
780 :
790 DEF PROCadjpalette
800 VDU24,0;0;1279;28;
810 IF col%>15 THEN col%=0
820 IF col%<0 THEN col%=15
830 GCOL0,128+col%
840 CLG
850 GCOL0,128
860 VDU26
870 PROCdelay(20)
880 GCOL0,col%
890 ENDPROC
900 :
910 DEF PROCdelay(t%)
920 NOW=TIME
930 REPEAT UNTIL TIME-NOW>t%
940 ENDPROC
950 :
960 DEF PROCclear
970 PROCrubline
980 PRINTTAB(0,31);"Are you sure(Y/N)"

990 *FX15,0
1000 key$=GET$
1010 IF key$="Y" THEN CLG:RUN
1020 PROCprintline
1030 PROCadjpalette
1040 ENDPROC
1050 :
1060 DEF PROCinitialise
1070 VDU23;8202;0;0;0;
1080 GCOL0,7
1090 MOVE0,32
1100 DRAW1280,32
1110 :
1120 x%=640
1130 y%=512
1140 ox%=x%
1150 oy%=y%
1160 kp%=TRUE
1170 step%=16
1180 col%=7
1190 PROCadjpalette
1200 ENDPROC
1210 :
1220 DEF PROCfinished ,
1230 CHAIN"bootstr"
1240 :
1250 DEF PROCsave
1260 PROCrubline
1270 IF M%<3 THEN himem%=&3000
1280 IF M%>3 THEN himem%=&5800
1290 OSCLI "SAVE $."+STR$(M%)+".wkfile
"+STR$~(himem%)+" 8000"
1300 PROCprintline
1310 ENDPROC
1320 :
1330 DEF PROCerror
1340 VDU6
1350 VDU28,0,31,19,30
1360 CLS
1370 PRINT"An error has occuredSave scr
een (Y/N)";
1380 REPEAT
1390 *FX15,0
1400 key$=GET$
1410 UNTIL INSTR("YN",key$)>0
1420 IF key$="N" THEN GOTO1440
1430 OSCLI"Save $."+STR$~M%+".Emergency
3000 8000"
1440 VDU26
1450 CLS
1460 PRINT'''
1470 REPORT:PRINT;" at line ";ERL
1480 OSCLI "KEY 0 LIST "+STR$(ERL)+"|M"
1490 *FX138,0,128
1500 END
```



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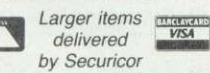
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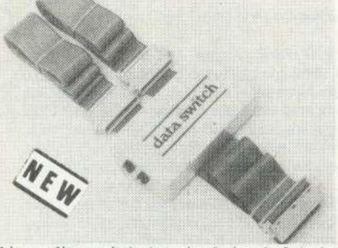
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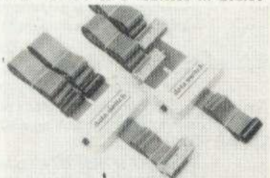


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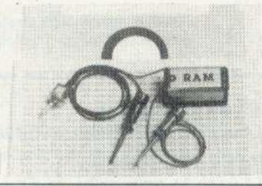
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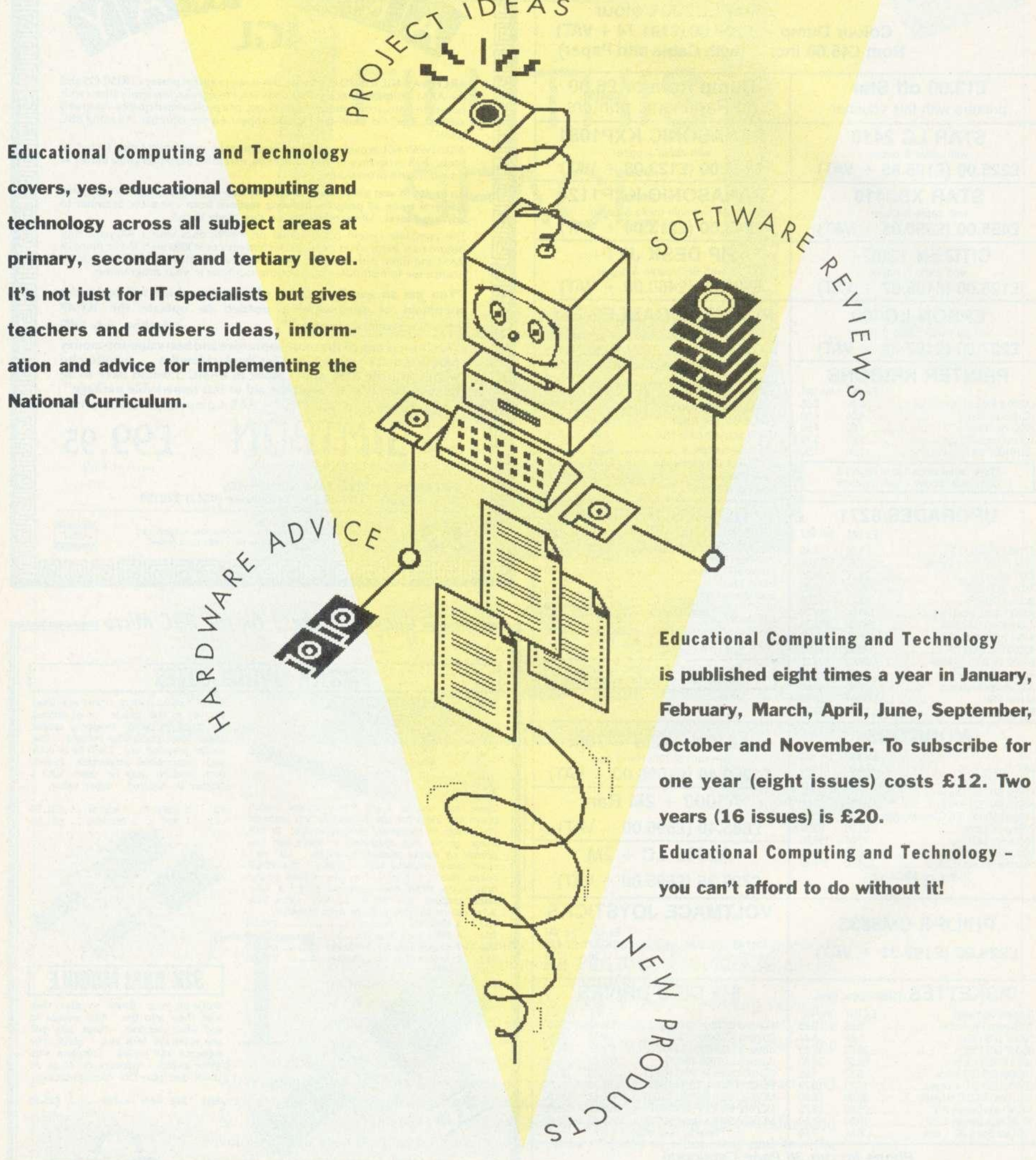
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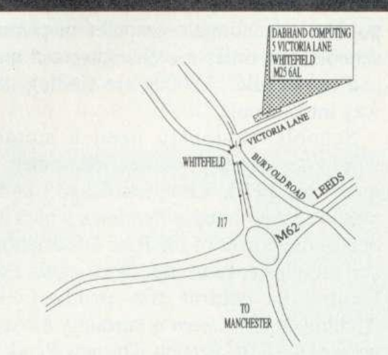
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POWER OF THE PEN

DAVE FUTCHER hails the arrival of an Arc version of the Pendown program

It was soon after computers first appeared in schools, that teachers saw the potential of wordprocessing to develop the art of writing.

Wordprocessors were recognised as tools to help children compose and refine their writing, focusing on a few skills at a time, until they were completely satisfied with their work.

In January 1986 Peter Hunter designed and wrote *Pendown*, the popular educational wordprocessor for the eight-bit BBC micro. The product was based on research undertaken by Hunter into the use of the wordprocessor as an integral part of the developmental process of writing. Its publication certainly meant that teachers and children in schools or at home were provided with a true educational wordprocessor. It set a new standard in educational software for the BBC micro.

The BBC micro still remains the most popular educational computer in primary schools, but times are changing and more and more BBC A3000s are finding their way into schools.

Schools obviously need a suitable wordprocessor for this new computer. To meet this need, Longman-Logotron has produced Archimedes *Pendown* which harnesses the power of the Risc OS desktop – and remains easy to use. Once again Peter Hunter is behind the product, but Archimedes *Pendown* is certainly not a rewrite of the BBC version. The new *Pendown* allows children to use and exploit the real power of the new generation of computers as a writing instrument.

Basic techniques

Starting to use *Pendown* is no different to any other Risc OS application. You click the disc drive icon to open a directory viewer and click the *Pendown* icon which is a rather realistic fountain pen design. This loads the program and places the *Pendown* icon on the icon bar ready for use. A click on the icon then produces a blank page with a ruler across the top of the page. You are ready to write.

Pendown has a host of powerful features

Pendown naturally word-wraps, and at the end of a page it automatically starts a new one. Unless you alter the page scaling, only part of a page is available on the screen at one time, but you can easily look back and forward in the text by dragging the scroll bar at the right of the writing window or clicking the scroll arrows.

There is obviously more to wordprocessing than simply typing in text, and *Pendown* has a host of powerful features. These are selected in one of two ways. Some are controlled by icons above the onscreen ruler and others by pop-up windows that appear when the mouse's menu button is clicked (the middle button).

Pendown's icons enable the user to control font type and size, the font colour, the underlining of text, the page layout, tabs, line spacing and so on.

Several fonts are provided with *Pendown* which makes it useful for creating signs, labels, notices and so on. Not only are the Trinity, Outline, Relief and Jumbo fonts included, *Pendown* will also work with any anti-aliased font. So, if you have a DTP package, its fonts can easily be added to the *Pendown* range.

As well as controlling the type of font used, the font icon controls the size of the font. Changing font size affects both width and height. It is possible to alter the height on its own so that tall, narrow, or short letters can be created. This is achieved by clicking the height window instead of size.

There is a small artist's palette icon which opens up a window to show the present set colour. When this is clicked, a long thin window appears showing the 16 colours which are available – these include white and seven greys.

Colour changes can be selected for a whole document or a marked block. The full potential of the colour options can only be fully realised with a colour printer like the Integrex Inkjet, but the option does offer exciting possibilities for varying shaded text in monochrome printout.

Three widths of underlining are available and you can place the underline in one of three positions beneath the selected text.

As you would expect, *Pendown* has the ability to lay out text in a variety of formats – left justified; right justified; left and right justified; and centred. This is all simply controlled from the Layout icon.

Three widths of underlining are available with *Pendown* and you can place the underline in one of three positions beneath the selected text. You can control line spacing (leading) too with *Pendown*. Control can be varied by the standard print unit of 1/72nd of an inch.

BBC eight-bit wordprocessors like *View* and *Interword* use rulers to help with layout. This is the case with most powerful business orientated wordprocessors too, on computers like the Apple Mac and the IBM PC. Now Archimedes *Pendown* brings this feature to educational wordprocessing.

The ruler can be scaled in centimetres, inches or picas, and the scaling is changed by simply clicking the ruler. Initially the ruler has two down-pointing arrows positioned below it.

On the left-hand side, the arrow is green and this sets the left-hand margin of the

page. On the right-hand side of the ruler is a red arrow and this controls the right-hand margin stop. If you want to move text around the screen you position the pointer above the green or red arrow and then click the right-hand mouse button and drag the arrow in the direction you want the page to move. The ruler is also the place where tab stops are placed.

Pendown allows you to have a number of rulers within a document so that different layouts can easily be set up.

In addition to the vertical ruler, *Pendown* can also have a horizontal ruler. This time green and red arrows are used to show the top and bottom text lines on a page.

Pendown offers the possibility to add pictures and diagrams created elsewhere. The use of the Graphics icon lets sprites or drawfiles be dropped into place.

As indicated earlier *Pendown* also uses a structure of menus to control other functions. The conventional Risc OS style is used and these menus are available by clicking the mouse's menu button while the pointer is in the text area.

This clicking places a main menu on the screen with its six options. These are File, Print Document, Page, Edit, Search and Replace. All these have right pointing arrows that enable further choices to be made from their sub menus.

The File menu gives full access to facilities for the saving and loading of text. Text can be saved as plain Ascii file or as a *Pendown* document with all the fonts and layout set up.

Printing your material is a crucial aspect of any wordprocessor and before you can print anything from *Pendown* you must load an appropriate Risc OS printer driver. This should really be done before you start writing. The actual printing within *Pendown* is controlled via the Print Document menu. You can set the number of copies to be printed and whether the whole document or only certain pages are printed. *Pendown* is set to print on standard sized fanfold printer paper and normal users will be happy with that. As well as standard sizes – A6, A5, A4, and A3 in portrait or landscape – controls are available for more precise page setting in millimetres.

Initially children will be happy inserting and deleting text using simple editing techniques, but they will soon be deleting whole words, moving lines and even copying and deleting whole blocks of text.

The final version of *Pendown* will include a powerful 35,000-word built-in spellchecker. The pre-release version which was used for this review did not have this but indications are that it will be a worthy partner for the rest of the package.

Particularly noteworthy is the separate *!Wordlist* application which will make the creation of user dictionaries an easy task – you merely drop Ascii text you want added to a dictionary into *!Wordlist*.

Configuration

Without a doubt *Pendown* is a powerful package offering the very best in educational wordprocessing. It is laden with facilities. Everything any school could ask for seems to have been included. But could this be its problem?

Many schools will remember some of the simple but effective eight-bit BBC wordprocessors like *Prompt* or *Writer*, which children mastered and progressed from. Many teachers may be fearful of the power of *Pendown*.

But Peter Hunter has thought that through too. He ensures *Pendown* can be used by inexperienced and experienced users alike by offering a configuration option making this a package that grows with the child.

Facilities and choices not appropriate for particular children's stages of development can be hidden, ensuring that its use is not daunting and off putting.

To change *Pendown*'s configurations you must load the program and click the middle mouse button on its icon on the icon bar. The menu that appears contains a configure option. If you wish to preserve the new configuration beyond the current working session you click the Save option and then the defaults created become active next time the package is loaded.

Conclusion

Archimedes *Pendown* is a very exciting product. It has been well designed and implemented, and will, I am sure, rapidly become an important and valuable classroom tool. It illustrates the reason why schools must move on from BBC model Bs and Master 128s to the world of 32-bit computing.

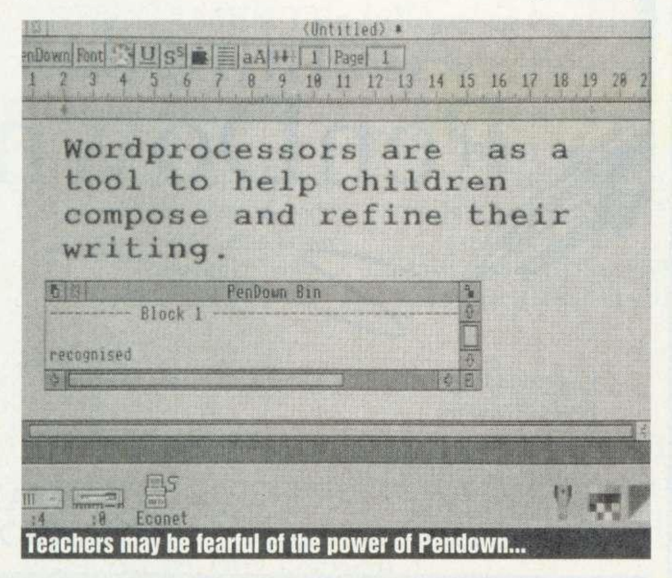
Pendown represents a huge step forward in educational wordprocessing, providing a comprehensive range of facilities which are easily learned and controlled.

The original *Pendown* was well known for the environment it offered for children to write within. This version goes much further. Any adult looking for a powerful wordprocessor would find that *Pendown* has much to offer them.

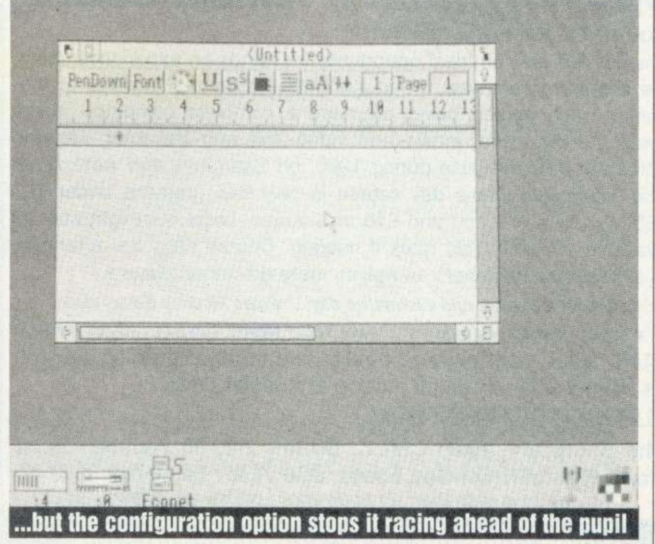
Although it is a shame you can't edit more than one document on screen at once like you can with Acorn's *!Edit*, you can have *Pendown* and a Risc OS database operating together and schools will soon realise the potential of that.

Children with access to *Pendown* and a BBC A3000 will produce work of the highest quality using the fonts and the Risc OS printer drivers. They will do it with considerable ease too, harnessing the real potential of writing with a computer.

Archimedes Pendown *is published by Longman Logotron, Dales Brewery, Gwydir Street, Cambridge, CB12 2LJ (Tel: (0223) 323656). It costs £44.85.*



Teachers may be fearful of the power of Pendown...



...but the configuration option stops it racing ahead of the pupil

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A Dennis Wheatley thriller full of mystery. If you enjoy detective stories, this is just for you!
RRP £24.95

BBC Micro/Master

Holed Out!
A spectacular 3D golf simulation that will keep you up to par.
5.25in disc (RRP £15.95)
3.5in disc (RRP £14.95

The Small Print

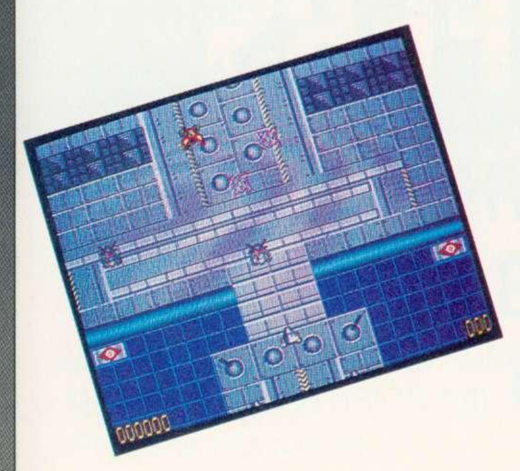
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1. No more than one free gift will be allowed per subscriber per year (unless you renew your subscription early. In which case your free gift will be supplied within 28 days). This means that we will no longer allow people to cancel their subscriptions and then re-subscribe to get another free gift.
2. This offer replaces all previous subscription offers as stocks of free gifts from previous offers are no longer available.
3. Please remember that your free gift will be despatched separately from the first issue of the magazine to which you subscribed or renewed.

Monthly disc offer

For readers who also wish to receive the *BAU* monthly disc, which is packed with great programs listed in each month's issue, we also have a great offer. For as little as £5, you can receive a monthly disc with each issue – further details later on in this section.

GAMES

Quazer



There was peace in the galaxy 15 million years ago – until the Werros came from the distant galazy of the Toosaheab. Some arrived in their fast streamlined Geith ships, others in less fast, but more manoeuvrable Roufs. Your task is to turn the tables – rebel intelligence has located the base planet of the Werros and it is your job to destroy it . . . You are in control of the specially-commissioned *Quazer* spaceship in this fast action cult spectacular. It features the most amazing graphics with superb parellax scrolling and great sound effects. Reflexes alone are not enough to deal with the waves of co-ordinated alien fleets and their deadly attack formations. Strategy, defence and bluff will be needed if you are to survive.

Archimedes/A3000	
RRP	£11.95
Special offer	£9.95
Saving	£2

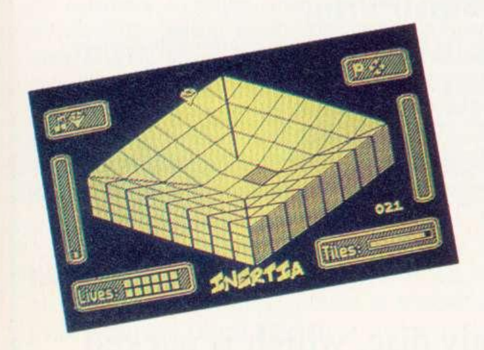
E-Type

Take control of £70,000-worth of gleaming Jaguar 'E-Type' sports car and head off on the drive of a lifetime. This is your chance to tear along lanes and motorways at speeds over 150mph. There are hazards galore, including other cars, roadworks, pedestrians, trees, rocks, bushes, oil spills, and many more. *E-Type* retains all the features of the Archimedes version, plus a few new features for added enjoyment.

BBC B/Master (5.25in)		**BBC B/Master (3.5in)**	
RRP	£14.95	RRP	£15.95
Special offer	£11.95	Special offer	£12.95
Saving	£3	Saving	£3



Inertia



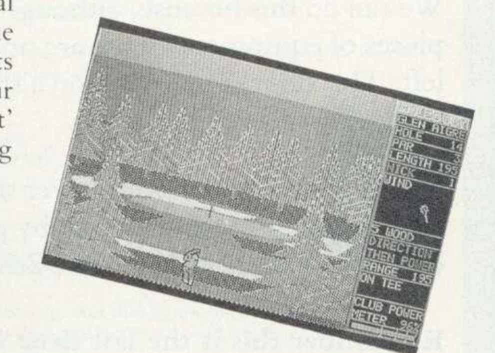
This game offers a huge landscape just waiting to be explored. Scattered (or rather fiendishly placed) around the landscape are many special tiles which need to be collected. Your highly sensitive craft floats freely around the landscape and you must exert forces upon it to guide speed and direction. You have a 3D viewpoint, displaying a tiny fraction of the total playing area. There are walls, bridges, tunnels and ramps to negotiate and a host of mystery tiles with strange properties, including ice, jump and transformation tiles. It will need lateral thought and a lot of dexterity.

BBC B/Master (5.25in)		**BBC B/Master (3.5in)**	
RRP	£12.95	RRP	£13.95
Special offer	£9.95	Special offer	£10.95
Saving	£3	Saving	£3

GAMES

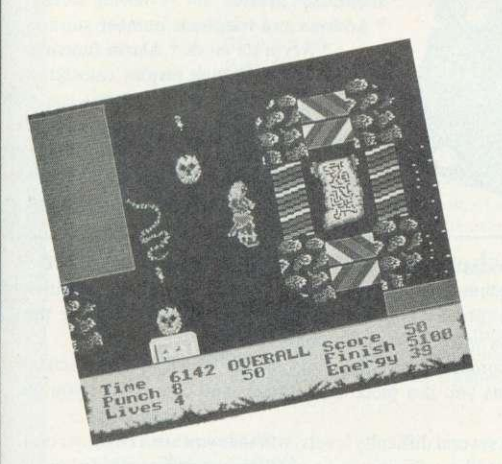
Holed Out!

This exciting 3D golf simulation features atmospheric sound effects to convince you that you're really playing the game. There are two contrasting 18-hole courses and, once you have mastered the easier first course, you should be ready for the greater challenge ahead. There are four skill levels, from beginner to professional, with an option for up to four players. A full three-dimensional view is given for each shot, so you can watch your player hit the ball into the distance – the shadow of the ball along the ground accurately shows you its progress. A constantly updated scoreboard allows you to monitor your progress as you negotiate your way through bunkers, rough and trees. A 'must' for golf enthusiasts, but just as much fun for any game players who are looking for a match for their skills.



Archimedes/A3000		**BBC B/Master (5.25in)**		**BBC B/Master (3.5in)**	
RRP	£19.95	RRP	£14.95	RRP	£15.95
Special offer	£16.95	Special offer	£11.95	Special offer	£12.95
Saving	£3	Saving	£3	Saving	£3

Man at Arms

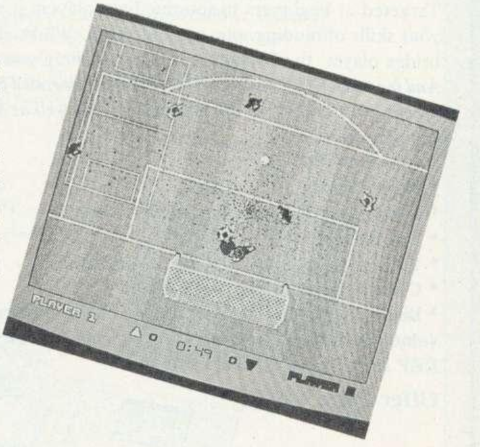


In the age when the castle was supreme, it took dedicated warriors to overcome its defences. In this challenging game, you are armed with a mighty sword cast from the remains of a thunderbolt which fell from the sky many millenia ago. Also in your possession is a magic potion which makes you invincible for short periods of time. Armed with these, you must penetrate the inner recesses of four castles and do battle with all you find in them. The subtle blend of arcade timing and adventurous puzzles makes this game fiendishly addictive!

Archimedes/A3000	
RRP	£19.95
Special offer	£16.95
Saving	£3

Arcade Soccer

This game really is football action at its very best. Using an overhead view to make gameplay as exciting as possible, it features everything you could possibly want in a football game. Corners, sliding tackles, throw-ins, goal kicks, dribbling, shooting, passing, and much more. Not only does *Arcade Soccer* give you total action, but it also puts you in total control. You can play with either keyboard or joystick, against the computer and/or with up to 23 friends! You can choose the skill of the goalkeepers, the speed and length of the game, play tournaments and even enter the most coveted of championships – the World Cup.



Archimedes/A3000		**BBC B/Master (5.25in)**		**BBC B/Master (3.5in)**	
RRP	£19.95	RRP	£12.95	*RRP*	*£13.95*
Special offer	£16.95	Special offer	£9.95	*Special offer*	*£10.95*
Saving	£3	Saving	£3	*Saving*	*£3*

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Remember this is the last time this offer will appear.

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★ Will produce transparencies
★ Internally processes down to 0.05mm
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RRP £699
BAU Discount £400

LAST FEW REMAINING

Offer Price £299

Save over 20% on the unique folding Microdiary

Specially designed so that it fits easily in your pocket or wallet, but opens out to give two manageable sets of keys and a two-line display, the 20k Microdiary is the ideal way to keep your important information instantly to hand.

Forget about paper personal organisers, the Microdiary has no trouble holding even the busiest person's contact list, as well as appointments, reminders, memos and much, much more — and you don't need a pen, or have to buy refill packs of paper each year!

And the best news of all is that for a limited period we have reduced the price of this unique device by £10. For just £39.95 you'll have one of the easiest, cheapest and most secure means of managing your personal data.



*** Daily, weekly, monthly and yearly reminder**
*** 21 definable function keys for quick access**
*** Security code to prevent unwanted access**
*** Paperless "printer" for reviewing entries**
*** Address and telephone number storage**
*** Accurate clock * Alarm function**
*** 10 digit display calculator**
*** 24 World time zones**
*** Memo function**
*** 20k memory**

RRP £49.95 BAU Discount £10.00

Offer price £39.95



If you can't make up a bridge foursome, try the Dual Screen Bridge Computer

Only slightly larger than a paperback book, yet featuring 28 keys and two displays, the Dual Screen Bridge Computer is the ideal way for you to practice bridge.

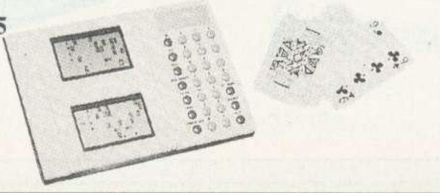
Targeted at beginners to intermediate players it will help you improve your skills of bidding, playing and recall. While, if you are an advanced bridge player, the Bridge Computer will help you to keep your hand in.

And for just £49.95, saving £10 off the recommended price, you're sure to find it helps your bridge playing to improve — as well as being a fun pastime you can play anywhere.

*** 4 levels of play**
*** Plays 3 hands**
*** Random cards generated for each hand**
*** You bid against the computer**
*** You can be dummy, declarer or defender**
*** Checks for and disallows illegal play**
*** Displays your cards, the dummy's hand, bidding, playing and vulnerability, and the results of contracts and tricks**

RRP £59.95 BAU Discount £10.00

Offer Price £49.95



The go-anywhere Pocket Chess Plus Computer

This is a truly pocket sized chess computer featuring a touch sensitive board so you can forget about entering fiddly coordinates because the Pocket Plus knows where you move each piece.

It comes with a comprehensive coaching facility which teaches tactical manoeuvres, warns you if a piece is in danger and even shows you its thinking.

Programmed with several difficulty levels, whether you are a beginner or a master, the Pocket Plus will give you a challenging game — every time. And it even remembers the state of play when you switch it off.

Normally the Pocket Plus sells for £34.95, but if you buy it from us we'll knock £5 off the recommended price. For just £29.95 you're guaranteed hours of enjoyment — where ever you are.

RRP £34.95 BAU Discount £5.00

Offer Price £29.95



Save £15 on the Saitek Sensory Backgammon Computer

This is a superbly presented portable or table-top backgammon computer which, like the chess computer, has a touch sensitive board so that it knows where you move the pieces.

It features 9 levels of play with a quick response program and a fully automatic random dice display. And if you don't want to play the computer you can use the board to play a friend too.

Recommended at £69.95, we have slashed £15 off the price of this superb product. Order yours today for only £54.95.

RRP £69.95 BAU Discount £15.00

Offer Price £54.95

MASTER COMPACT



Brian Clough's Football Fortunes

Brian Clough's Football Fortunes is a football management game with a big difference. In an exciting departure from earlier simulation games it combines an excellent range of computer based features with a fascinating board game.
Can you compete with human and computer managers to successfully steer your team through the season, using your skill to make it stronger as you proceed?
With the program you get a large playing board, over 100 player cards, stacks of money, some counters and a comprehensive instruction manual. And for only £7.99 you're guaranteed hours of inexpensive yet intense, action-packed excitement!

RRP £9.99
BAU Discount £2.00
Offer Price £7.99



Colossus 4 Bridge

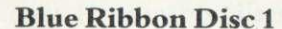
Colossus Bridge allows one player to play a complete game of bridge with the computer controlling the other three hands. Each hand is bid according to the Acol system, while other standard conventions are also available.
If you're a beginner at bridge you can make use of the in-built tutor which has 10 specially chosen hands to illustrate the principles of the game.
In fact, for just £10.99, whether you're a beginner or a more advanced player, you'll find Colossus Bridge is the ideal partner, either for practise or when you can't get another three people together for a game.

RRP £14.99
BAU Discount £4.00
Offer Price £10.99

Tank Attack

Tank Attack is a computerised board game for two, three or four players, where each player takes the role of a General commanding a country's Tank Corps of one or more armoured divisions.
Your objective is to capture the enemy headquarters, which will require the planned strategic deployment of your forces and regular fire duels between your own and enemy units.
Weather, morale, skill, judgement, planning, foresight, careful management of rebuild and repair facilities and luck all play a part in deciding the result of each game.

RRP £14.99
BAU Discount £4.00
Offer Price £10.99





Birdie Barrage Golf

An excellent golf simulation offering you the chance to play at the famous Turnberry Ailsa, Belfry Brabazon, Carnoustie Championship and Acorn Park golf courses.
All the features you'd expect form a good golf game are here, including woods, water and bunkers.
And for just £7.99 this must be a game that should be in everyone's collection.

RRP £9.99
BAU Discount £2.00
Offer Price £7.99

Colossus 4 Chess

Probably the most complete chess program available for any home computer and written using the very latest techniques, by a computer chess programmer with over eight years experience.
Colossus perfectly understands the rules of chess and can handle all standard mates, while offering you the choice between a two- dimensional flat board or a stunning 3D display.
It comes with a comprehensive instruction manual and must be the best chess program for casual and serious players alike.

RRP £14.99
BAU Discount £4.00
Offer Price £10.99



Steve Davis Snooker

This has to be the best snooker simulation you can buy, which is surely proven by the fact that Steve Davis has endorsed it!
It includes a computer play option, infinitely variable speed, spin, friction factor, break score and a foul shot facility, as well as superb graphics.
If you fancy yourself as a good snooker player, for only £9.99 why not see just how good you are at the computer version.

RRP £12.99
BAU Discount £3.00
Offer Price £9.99



Sporting Triangles

No matter what your sporting preferences may be, Sporting Triangles is bound to intrigue, puzzle and frustrate you.
It includes over 2,500 questions to choose from, across 12 action- packed sports.
All the features of the top rating TV quiz show are combined in this superbly presented and equally compelling game.

RRP £14.99
BAU Discount £4.00
Offer Price £10.99



Football Director

Billed as the ultimate football challenge, Football Director features four leagues with 20 teams each, a 38 game season, home and away matches, FA and League Cups, replays and much, much more.
In fact it's so packed with features it really is almost like the real thing, including player's morale, substitutions, injuries, transfers, promotion and relegation, tax, interest, wages and many more than there are room to print here. At the virtually give-away price of just £9.99 Football Director will give you hours, if not days or weeks, of action-packed excitement.

RRP £12.99
BAU Discount £3.00
Offer Price £9.99

Blue Ribbon Disc 1

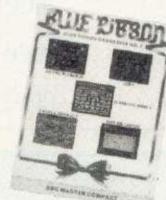
Five superb games on one disc:
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* Nightmare Maze
* Darts
* Diamond Mine
* Screwball



RRP £9.99 BAU Discount £2.00
Offer Price £7.99

Blue Ribbon Disc 2

Another excellent compilation of five action-packed games:
* Astro Plumber
* Joey
* Diamond Mine II
* Castle Assault
* Bar Billiards

RRP £9.99
BAU Discount £2.00
Offer Price £7.99

Please order using the order form.

3 D C A D

BAU is pleased to offer its readers a great multi-tasking 3D graphics and animation system for the A3000/Archimedes

***Euclid 2* from Ace Computing is the only multi-tasking 3D graphics and animation system for the Archimedes/A3000. Completely re-written to follow Acorn's guidelines for Risc OS applications, *Euclid 2* is a fully interactive, multi-document, 3D, graphics and animation system.**

Designed to be simple for the beginner to get to grips with, it has an intuitive icon-driven single-window interface. You can quickly throw new ideas together, rotate them in real time, zoom in and out, view them in perspective from any position and even show the effects of lights placed anywhere in the scene. *!Draw* files can be exported and imported.

Special Offer Price – £50 (3.5in disc)
(RRP £70, a saving of £20)



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Every month, *BAU*'s yellow pages carry lists of the programs featured in the issue. Of course, readers who don't want to tap in program details can obtain all the programs on our monthly disc.

To ensure you receive your monthly disc, why not add it to your annual subscription? Each month, for an additional sum (starting at only £5, depending on format) we can send you a copy of the monthly disc with each subscription issue, with a saving on any additional postal charges.

A breakdown of the disc prices is shown below. Remember to add the appropriate price to the cost of the annual subscription (£22.95). Please note that disc subscriptions must be taken up at the same time as the issue subscription.

Of course, non-subscribers can also obtain the monthly discs separately – see full price list below.

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UK	£5.00	£10.00
Europe (Airmail)	£9.00	£14.00
Overseas (Airmail)	£19.00	£24.00

If you are not a subscriber to *BAU* but would still like the monthly discs, there is an extra charge to cover the cost of postage and additional protective packaging. This still means that, in the UK, the 5.25in discs will cost you less than 70p each, while the 3.5in discs will be just over £1.

Here are the various worldwide prices:

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UK	£8.00	£13.00
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Overseas (Airmail)	£30.50	£35.50

VISA

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SUBSCRIPTIONS

with FREE game (UK only)
£22.95

	BBC 5.25in disc	BBC 3.5in disc	A3000/Archimedes
Herewith the Clues	–	–	20000 ☐
Holed Out!	20001 ☐	20002 ☐	–

Please tick the FREE game you require

☐ 1000 New ☐ 1001 Renewal

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(Remember, the magazine subscription price is not included. If you don't yet have a subscription to the magazine and wish to receive the Monthly Discs at this low price, you must also take out a magazine subscription using this order form).

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Europe (Airmail)	£9.00 ☐	£14.00 ☐
Overseas (Airmail)	£19.00 ☐	£24.00 ☐

The next 12 monthly discs despatched on their own without the magazine:

	5.25in	3.5in
UK	£8.00 ☐	£13.00 ☐
Europe (Airmail)	£14.50 ☐	£19.50 ☐
Overseas (Airmail)	£30.50 ☐	£35.50 ☐

MASTER COMPACT

Colossus 4 Chess	☐ 1550	£10.99
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Sporting Triangles	☐ 1552	£10.99
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MONTHLY DISCS

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GAMES

	BBC 5.25in	BBC 3.5in	A3000/Archimedes
Holed out!	20001 £11.95 ☐	20002 £12.95 ☐	20003 £16.95 ☐
Man at Arms	–	–	20004 £16.95 ☐
Arcade Soccer	20005 £9.95 ☐	20006 £10.95 ☐	20007 £16.95 ☐
Quazer	–	–	20008 £9.95 ☐
E-Type	20009 £11.95 ☐	20010 £12.95 ☐	–
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	Cassette	5.25in disc	3.5in disc
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The Publisher		☐ 1712 £49.95	☐ 1711 £49.95

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Dual Screen Bridge	☐ 1902	£49.95
Sensory Backgammon	☐ 1903	£54.95
Tandy Flatbed Plotter	☐ 1121	£299.00

ELECTRON

NTQ two-Rom pack	☐	1500	£19.95

Watch out for these pages next month! We'll have some very exciting Xmas bargains. Don't buy your Xmas pressies until then!

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THAT WAS THEN...

Back in 1982, Tony Quinn worked on the first issue of what was then *Acorn User* and subsequently became editor for the next six years. He reflects on those heady days at the start of popular computing...

It's difficult now to believe how revolutionary the BBC micro was when it first appeared almost 10 years ago. It was designed as a fully-fledged system right from the start, at a time when the IBM PC was barely off the ground and cost £3000 before you started adding the basic interfaces. Few people could consider buying a disc drive – even a 100K single-sided drive was £400 – but the Beeb helped to introduce computers into the home.

When *Acorn User* first started in 1982 under the auspices of Acorn (it is now an independent magazine), it was run on an upgraded model A with no printer interface. When the magazine wanted to run listings, we had to send them to Acorn to be printed out! And the problems we had finding a daisywheel printer which could tell the difference between 0 and O or 1 and l..!

Listings usually came in written by hand or typed. Printers were rare and people thought Epson was the misspelt name of a famous racecourse in Surrey. *Wordwise* was just appearing and *View* was yet to come.

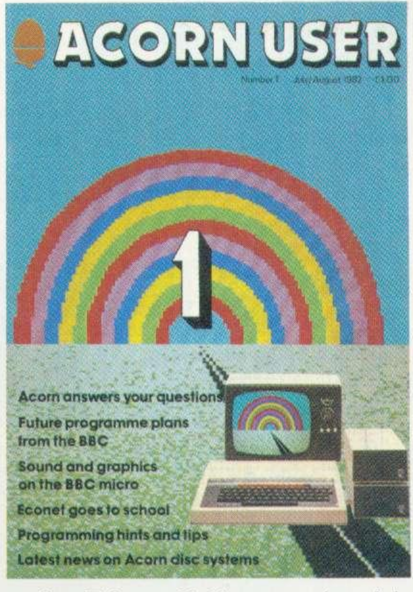
For the first year of *Acorn User*'s life, most of the news was gleaned from meetings with Acorn's two founders, Hermann Hauser and Christopher Curry. You could walk into the research and development division at Acorn's Cherry Hinton building to find programmers hacking away, turning out code for this second processor or that add-on which might be launched in a few weeks' time. Or you could turn a corner to be dazzled by the latest graphics creation by Acorn whizzkid, Roger Wilson.

The launch of *Elite* was astounding. We knew something was up at Acornsoft (the name Commander Jameson had already appeared in the Abuser Diary) but not what. I was virtually smuggled into Acornsoft for the first review and couldn't believe what I was seeing. I was sure there must be a second processor hidden in there somewhere.

There are many milestones in the history of the Acorn market and the magazine that stick in my mind. *Megamonsters*, launched in 1983, was a long, fun game that worked. The first listing to produce fractals from Susan Stepney started a trend a year later.

Joe Telford's four-line Basic program to get into Telecom Gold was a god-send: he read it out over the phone when my comms disc corrupted. The Mandelbrot routines really opened people's eyes and confirmed *Acorn User*'s reputation for graphics.

In '82, journalist friends advised against taking the job at *Acorn User* – they said computing was a fad and would fizzle out. It's been a long fizzle!



THIS IS NOW...

***BAU*'s latest editor, Barry Monk, looks at where the magazine stands today and reveals how some interesting findings gleaned from the latest reader survey will affect the magazine's future coverage...**

I wasn't involved in the home computer market back in 1982 – but not many journalists were. But I remember tuning in to those first BBC programmes about computing and being fascinated by the whole concept of 'home computing' – suddenly, the whole thing was accessible.

Today, of course, tapping on a keyboard in front of a screen is commonplace, in offices, schools and homes.

There is no doubt that Acorn set a pace of progress in the early days of computing which has yet to be matched. At the last count, there were around 1.25 million Acorn eight-bit machines (BBC model Bs, Masters, etc) out there in computerland. Although the number of more recently launched 32-bit machines is nowhere near that figure, numbers are growing steadily.

A combination of high interest rates and cut-throat competition has meant that new machines – of whatever make – are no longer flooding out of the manufacturers' doors into the arms of eager owners. This is a particular problem for a company like Acorn, which has a track record of producing technologically-advanced, premium priced products for specific markets.

Acorn has dominated the education market for years – a situation which looks likely to continue, despite many of the recent changes that have taken place in education. The company has also reorganised recently to address other key market segments, not least of which is home computing.

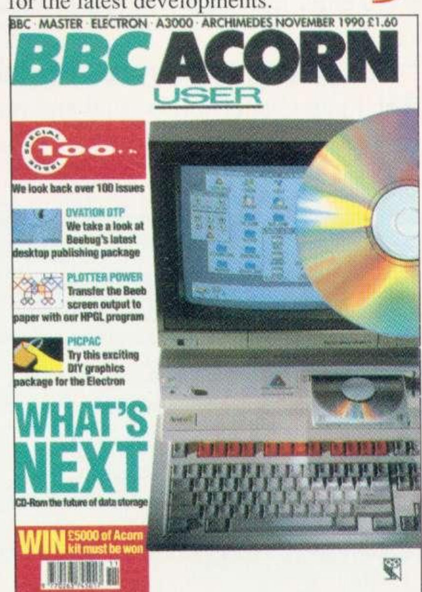
Our latest reader survey reveals that a large majority of readers have eight-bit machines, particularly the model B, but just over half also own (and have probably upgraded to) the A3000 and Archimedes machines. So use of the 32-bit machines is undoubtedly increasing, with many readers owning (if not using) both types.

So how will these, and other, figures taken from the survey affect this magazine's content? Well, we are currently looking at our coverage of both eight and 32-bit machines and how to cover both.

The survey has helped to confirm some of the items you would like to see more coverage of. Indeed, there were many interesting suggestions which we will be following up for inclusion in future issues.

This issue has been put together to celebrate some of the key developments in the various areas of our coverage – from education to DTP – since we first launched 100 issues ago. But there is also some crystal ball gazing, in particular a review of the Next CD-Rom player, which is a pointer to the future of data storage and retrieval.

So keep reading *BBC Acorn User* for the latest developments.





WIN £5000 OF ACORN KIT

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- A BBC Master

This month, *BBC Acorn User* is 100 issues old. To celebrate the event together with Acorn, we are offering the chance to win three computers worth around £5000.

The competition is split into three separate categories, with a prize for each. In category one, the prize is an A540, Acorn's latest top-of-the-range Archimedes machine (previewed in last month's issue).

In category two, the prize is a BBC A3000, with a BBC Master machine as the prize in category three.

Entrants can choose which machine they would most like to win and answer the three questions in the relevant category and complete the tie-breaker. Answers must be listed on a postcard only and you may enter only one category.

So enter now and win one of these super *BBC Acorn User* 100th issue celebration prizes.

The closing date for the competition is Monday, December 3, 1990. The judges' decision is final and no correspondence will be entered into.

Tie-breaker

Whichever category you choose to enter, please complete the following sentence in not more than 20 words.

I read *BAU* because..

....

....

Include your three answers, the tie-breaker and your name and address (and daytime telephone number if possible) on the postcard and send it to: *BAU* 100 competition, *BBC Acorn User*, Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ.

Category One

Prize - Archimedes A540

1. *BAU* has had four editors in its 100-issue history. Five names are listed below, but which one was NOT an editor of the magazine?
a) Barry Monk
b) Tony Quinn
c) Graham Bell
d) Bruce Smith
e) Geoff Bains

2. What is the nickname for the VIDC chip?
a) Arabella
b) Louise
c) Sophie

3. Two people at Acorn were responsible for the development of Risc technology. Of the three names below, which one was NOT involved?
a) Roger Wilson
b) Chris Curry
c) Steve Furber

Category Two

Prize - BBC A3000

1. In which year was the Archimedes series launched?

2. What does Risc OS stand for?

3. What was Archimedes' famous catchword?

Category Three

Prize - BBC Master



1. In which month and year was the first issue of *Acorn User* published?

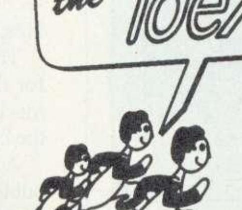
2. In which month and year will the 200th issue of *BAU* fall?

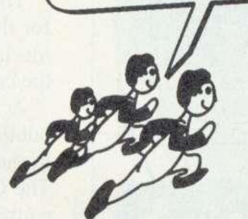
3. Which bird is used as the BBC micro symbol?

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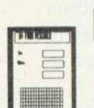
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MALCOLM BROWN looks back through the years at some of those famous – and infamous – Acorn legends

In a dimly lit studio a single spotlight illuminates the figure seated, legs crossed in the padded leather swivel armchair, studying the clipboard resting on his knee. Corny BBC2 theme music fades out and David Jacobs lifts his eyes to the camera and says 'The model A...the Phloopy...Mach Technology – where are they now?'

OK, so television is unlikely to devote much prime time to IT nostalgia, but a great many Acorn-related products, people and nebulous concepts have come and gone in the 100-issue life of *BBC Acorn User* and the BBC micros.

Everyone remembers the model A (many with an involuntary sigh of affection). Many will remember Mach Technology (some with a growl of indignation). But who remembers the Phloopy?

The Phloopy was, six years ago, one of the many answers to the Sinclair Spectrum Microdrives (although quite why that particular piece of misplaced technology needed an answer seems uncertain today).

This was a tape cartridge data storage system with a random access filing system, back in the days when disc drives cost £400 a time. The Phloopy was very clever, using custom designed cartridges and specially made multi-track read heads. It cost God knows how much to develop, sold for £99 a time and was a complete flop.

The Phloopy wasn't alone. The Hobbit 'floppy tape drive' from Ikon used dictation cassettes for a similar idea and sold a fair few units before the inevitable price reductions on disc drives and discs rendered the whole kaboodle so much history.

Even Acorn, in those days always keen to show rivalry with its fellow Cambridge computer maker, was working on a floppy tape system of its own. It was going to be released as Plus Something for the Electron, but it never saw the light of day.

Speaking of broken promises, in the first ads for the BBC micro (put out by the BBC, incidentally) there was much talk of secondary languages like Pascal and a 16-bit second processor to follow soon.

The only Acorn 16-bit second processor for the Beeb appeared in the Acorn ABC machines, and they never got further than the cover of *Acorn User*.

A 16-bit second processor did reach the public, but it was from Torch, a name much in the Acorn public eye a few years back. The Graduate promised almost IBM compatibility at a price of £950 – about the cost of two complete PC clones these days.

But Torch really made its mark with the Torch Disc Pack – a box of two 80-track disc drives cunningly designed to sit underneath the Beeb to raise the keyboard for maximum inconvenience.

That was the time when the one add-on every self-respecting Beeb owner had to have was some mechanical contrivance to move a cursor around the screen.

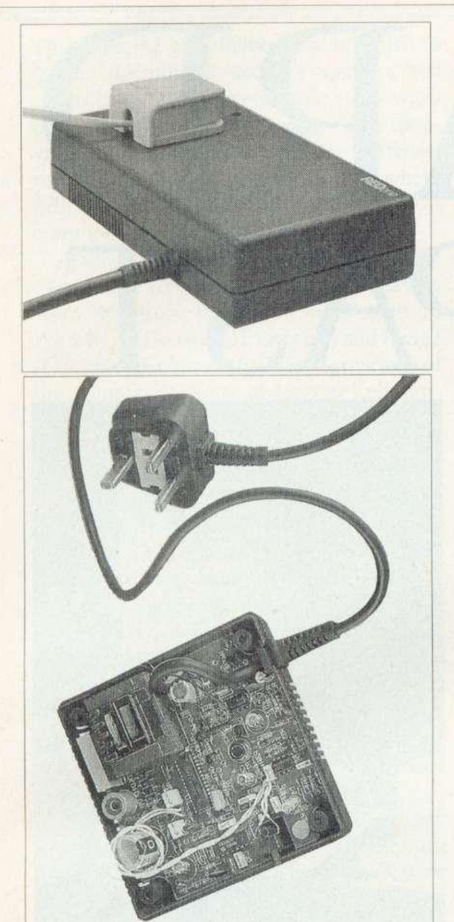
The first of these were often called 'digitisers' – not a name that would go down too well under the Trades Descriptions Act these days. These used articulated arms on potentiometers connected to the analogue port to trace an outline onto the screen. Within limits they worked very well and didn't cost too much, but you never see them around today.

Next came lightpens – the ultimate user friendly user interface (or so the ads probably said). Most of these used £2 of electronics in the fanciest old felt tip pen case they could find, didn't do anything useful and still sold by the dozen for £20 or more.

The final chapter in user interfaces was the mouse. AMS started it all as a copy of the Macintosh mouse. Nobody dreamt then


Bearing the Torch of inconvenience





Red Boxes turned your computer into a command terminal and brought us one step closer to home automation

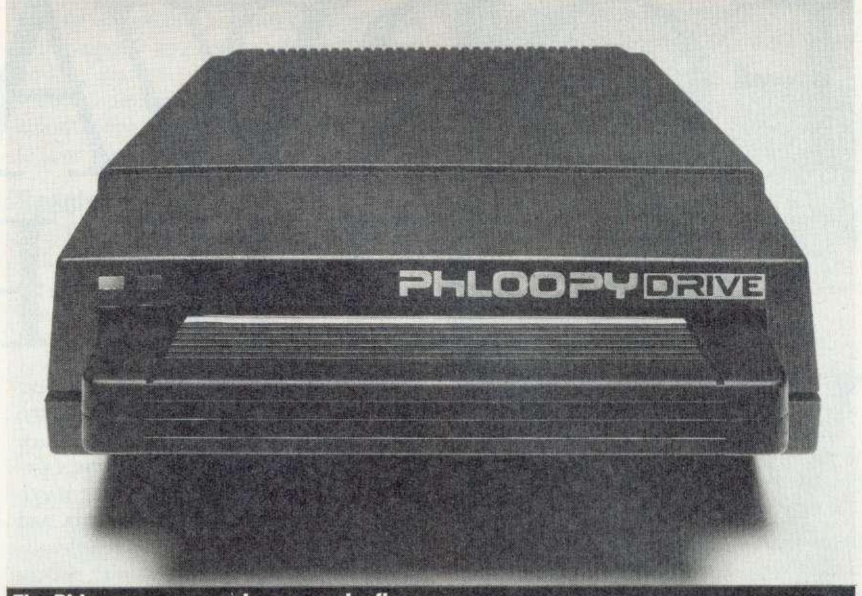
that the Beeb's successor would match and overtake the Mac in that and other fields.

Many ideas seemed to be based on a need to use up injection moulded plastic – all the Rom cartridge systems for the model B and the innumerable new cases for your micro that held your disc drives and detached the keyboard so it could look just like a 'real' computer.

Some add-ons were plain silly: two car radio speakers in plastic boxes to stick each side of your computer – the Micro Voc instant surroundsound experience for £21.



Hermann and Chris in model A suits



The Phloopy was very clever... and a flop

Sound was always a popular area. Apart from the numerous speech synthesiser add-ons that proliferated soon after it was realised that the 'official' Kenneth Kendal voice for your Beeb couldn't even say 'And here is the news', add-on music keyboards were the order of the day for some years.

Then there was the Music 500 – almost never heard of again after Acorn's initial ads for the beast about three months before it was available. That was resurrected as the Music 5000 but then Peartree tried to resurrect the cheap 500s now flooding the market as the Music 87.

Unfortunately the screenshots in the ads were faked, so few reached the punters' hands – sharp musical practice falling flat.

Of course, software is the most transient of the memorabilia. We all got excited over the efforts of Micro Power, Software Invasion, Quicksilva, Kansas City Systems and a dozen other blossoming companies, and then scarcely noticed as they faded away.

But they left such milestones in entertainment as *Felix In The Factory*, *Attack On Alpha Centauri*, *Swoop*, *Muproc* and *3D Bomb Alley*.

And what of the people? The whereabouts of some are well known. Many of Acorn's past marketing staff sneaked off to the Apple world or the joys of Olivetti.

Chris Curry is still waiting for the world to catch up with his ideas on home automation (with just £600 of electronics, your curtains open themselves in the morning – three hours before you want to get up).

Hermann Hauser is still about to unleash on the world an electronic book that's exactly the same size as a printed one.

From *Acorn User* itself nearly-first editor Tony Quinn (or now Anthony Quinn as he prefers) is writing about trains. Erstwhile *AU* agony aunt Kitty Milne was last seen writing about gardens. Last-but-one editor, Graham Bell is still writing about anything he can tie to his Arc, while the last editor, Geoff Bains, decided he'd had enough and now spends his time gazing at satellites.

TEN THINGS YOU NOW CAN'T BELIEVE EVER REALLY HAPPENED

- Cassette software
- Black & white Watford Electronics ads
- The Sparkjet printer
- JCB Digger
- Stapled *Acorn Users*
- Laserbug
- Bruce Smith
- Acorn Computer Racing
- Merlin Scribe
- Red Boxes

TEN THINGS YOU THOUGHT YOU'D NEVER SEE THE END OF AND THEN MISSED THEIR PASSING ALTOGETHER

- Polyhedrons in Acorn ads
- BBC Soft
- *Repton* games
- MEP
- Tessie Revivis and Lydia Spencer (you know who you really are)
- Ads for disc drives
- The Demon Modem
- Interactive video
- Bar code listings
- Data Store ads featuring 'Dave' (and 'Harold')



FORWARD TO THE PAST

With our 100th issue, we have hit the nostalgia button and concentrated our minds on some of the key developments that have taken place in the Acorn market since 1982. But, on the basis that we can all learn from what has gone before, there are also some useful indicators for future trends. So, whether you are involved in education, business or home computing, read on...

EDUCATION

A lifetime seems to have passed since the birth of the BBC micro and the 1981 announcement of the Government's scheme to put one machine in each primary school.

By the time the Department of Trade and Industry scheme ended in 1984, approximately 32,000 primary schools in England, Wales, Scotland and Northern Ireland had acquired a micro, the BBC model B beating the Sinclair Spectrum and the Research Machines 480Z hands down.

Of course Acorn had a toehold in education even before then. The BBC micro's precursor, the Atom, enjoyed a certain popularity in schools' networks and as a means of monitoring lab equipment.

The first generation of children to experience educational computing had to contend with programs stored on tape and all that meant, particularly the screen messages DATA – BLOCK – HEADER and REWIND TAPE. What an innovation it was when disc filing systems and disc drives arrived.

1983 saw the first range of official educational software. The Microelectronics Education Programme (MEP) released four *MicroPrimer* packs containing over 30 programs. Although rather on the lean side with drill and practice matching programs, number bonding and simple puzzles ruling the day, it was a beginning.

By 1985 MEP's National Primary Project was in full swing, with Anita Straker at the helm. A series of resource packages such as *Primary Maths* and *Micros and Language Development*: *The Role of the Micro* found their way to LEA inspectors and advisory teachers and onward into schools.

These training packages with freely copiable software, course readers, OHP and tutor guidelines were just what schools needed.

Infant and First School: The Role of the Micro pack was probably one of the project's best, providing primary schools with some powerful tools, including *Ourselves* and *Our Graphs*, which enabled pupils to store information, to interrogate it and display it as a graph.

Writer offered young children a simplified range of wordprocessing facilities, and *Infant Tray* was a scaled down version of the well established content-free *Developing Tray* close procedure program.

Without a doubt, the BBC micro has infiltrated primary schools and has had an effect on the curriculum. Even the smallest schools have three or four machines and many larger schools have a computer between two or three classes.

Eight years on, the BBC eight-bit hardware remains the same but some interesting comparisons can be made between software that has become available in the last couple of years and what was published when the Beeb first arrived in primary schools.

A wide range of software is now available to support learning across the whole curriculum. The tools for wordprocessing, data handling and graphics are second to none. The latest titles have a sophisticated feel to them and the graphics are as good as they can be on an eight-bit machine.

The BBC Master 128 is still in production and Acorn has promised to support model B components for the foreseeable future. The financial constraints on primary schools mean that all the existing BBC machines will not be replaced by more powerful machines in the immediate future. The age of the BBC micro continues into the 1990s.



Concept Keyboard aids primary pupils

Secondary issues

Computing has developed into the most varied and influential single force to have hit secondary education since the introduction of pencil and paper.

From a tiny seed (an acorn?) which grew so idiosyncratically, there has grown a whole new curriculum area entitled technology; a synthesis in which home economics, business studies, craft, design and technology and, of course, computer studies, have all been subsumed.

This new area focuses on the skills necessary to take the new generation of school leavers into the enterprise culture of the late 1990s and early 21st century.

But the birth of this new subject has not been without its pangs. The Department of Education and Science, in conjunction with the Department of Trade and Industry, began the IT in Schools scheme back in the early 1980s.



This exercise was deliberately intended to 'prime the pump', and get teachers and pupils interested in investigating new ways of using a growing technology. This innovative approach produced very different results from those in other countries where drill and practice software became the most common use for computers.

In this country, however, adventures like *Flowers of Crystal* and *Granny's Garden* from 4Mation, computer tools such as *Wordwise* (Computer Concepts) and *Image* (Cambridge University Press) grew out of the combined efforts of teacher and software producers.

The end result has been a greater emphasis on content-free software – computer productivity tools which enable the user to work more effectively or produce better quality output than they could have done previously.

Secondary school software development has been coupled with a corresponding development in hardware which has reached its peak in the powerful and flexible Archimedes A3000 computer. The difference between its multi-tasking environment and the user interfaces of earlier machines is quite staggering.

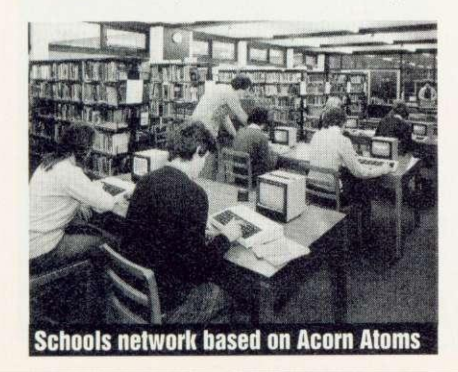
However, the greatest hurdle industry has to overcome is that secondary teachers are naturally conservative and like to stick with what they already have. This attitude has as much to do with their workload as with any real Luddite leanings.

Consequently, Inset courses nationwide are coping with teachers holding the mouse upside down and rolling the ball with their fingers, using two hands to operate the mouse, holding it backwards or refusing to use it at all.

Children, on the other hand, are leading the way, quickly grasping the concept of the window system and the means to interact with the mouse and its pointer.

The question is where does all this lead? What does the future hold? It is fairly certain that CD-Roms will be a standard means of data exchange.

Worm discs (Write Once Read Many), a variety of optical disc, look likely to be commonplace and the chances are that huge on-line systems will be available to all schools, probably via satellite. That and much more awaits the youngsters just about to start school. Lucky devils!


Schools network based on Acorn Atoms

Special cases

The BBC model B and the BBC Master 128 have proved to be very effective tools for children with special educational needs. This is partly because the BBC machine has many interfacing possibilities – user port, analogue to digital converter, RS432 port and 1MHz bus. These enable the computer to be controlled by a wide variety of input devices.

It is acknowledged that the BBC micro's standard Qwerty keyboard is not the ideal interface for most classrooms and certainly not for children with special needs. By 1985 the Star Microterminal Concept Keyboard was becoming a popular add-on. With purpose-designed overlays which could include pictures, symbols, words, letters or numbers, controlling and interacting with software was considerably improved.

But some children cannot use a traditional keyboard or a touch-sensitive Concept Keyboard. They have to use switching devices. Therefore a wide range of single and double switches that can do the inputting job for the child have been developed.

Queenswood Scientific supplies switches that can be operated by various parts of the body. These include chin lever switches, an eye switch, lip seal and puff-suck switches. Quest Educational Designs produced switches housed in box constructions designed for use by people with weak or sweeping limb movement.

The Photonic Wand, developed by Doctor J B Cole in 1984, is an unusual and effective device for operating a BBC micro by head movements. The device consists of a light-weight helmet which is worn by the user. On the front is an optical sensor which is connected to the analogue port.

The Photonic Wand functions rather like a light pen. Specially written software has been developed for writing, making music and art work.

By 1985, Microvitec, which manufactured most of the colour monitors sold with the BBC micro, had developed a touch screen for use with the BBC. Called the Touchtech 501, it fits around a normal Microvitec colour monitor and is a wonderful way for children to interact with a computer. Instead of pressing keys on a traditional Qwerty keyboard or even a Concept Keyboard, you simply touch the screen of your monitor.


Microvitec's Touchscreen

The early days of the BBC micro also saw important developments in voice control. Magpie Systems brought out a low cost system based around a modified citizens' band radio mike and called it, appropriately, Micro Mike.

With its accompanying software, it ensures that children can get the most out of vocal play and gives them the chance to develop vocalisation in order to control what they want to do.

Over the lifetime of the BBC micro a number of speech systems have been developed. There was Acorn's own, based around the voice of newsreader Kenneth Kendal; Technomatic produced a capable Smartmouth; but the system that has probably been the most popular in special schools is the Votrax Personal Speech System.

This uses the SC-01 speech chip and allows the creation of an unlimited vocabulary. Text is sent to the unit via the computer RS432 port, where it is translated into electronic speech by an on-board Z80 processor based on a text-to-speech algorithm.

All the input and control devices have some sort of software support supplied but sometimes more is needed. Clwyd Technics produces solderless connections to fit inside the BBC, allowing control by a range of special input devices. This is called the BBC Keyboard Emulator.

A useful range of programs have been developed for the Touchtec 501 by a number of companies but it is the Concept Keyboard that is the best supported, with many 'mainstream' packages having options giving control by overlays.

Nick Evans and Dave Futcher



GAMES

A hundred months ago *Snapper*, the first BBC version of *Pac-man*, a game that had dominated the arcades across the country many months before, was reviewed in a magazine dedicated to the BBC micro.

The *Snapper* review in the first issue of *BAU* accompanied those of *Planetoid* and *Monsters*, also very good games.

Re-reading that first issue is rather amusing – I quote: 'since the BBC computer is still in its infancy, there isn't much software available on the shelf – all the more reason to get down to writing your own programs and dumping them onto tape'.

There have been many memorable games since then, all of which make good playing today. Indeed, most are much better than recent offerings.

On the platforms and up the ladders, *Boffin* was a brilliant game, and comes second only to *Chuckie Egg* in my book – remember the big duck? *Frak!* from Orlando is also an excellent game.

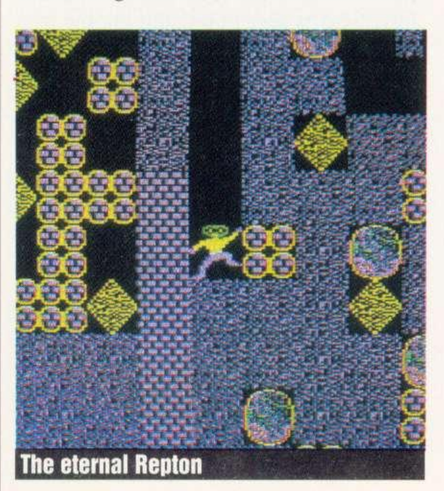
Stryker's Run deserves a mention for being the first to use the Master 128's graphic enhancements, and *The Sentinel* presented us with an original concept that didn't involve shooting aliens.

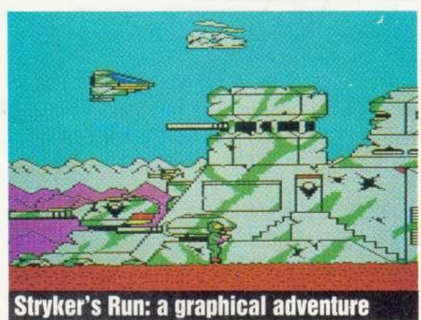
Thrust is still the game which most accurately obeys the laws of physics, and is good fun to boot.

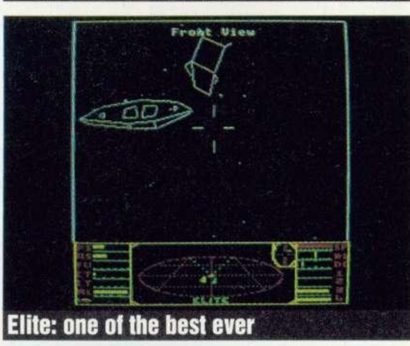
In the same domain of excellence are *Firetrack*, also from Orlando, and the classic shoot-em-ups, *Zalaga* and *Galaforce* which could be described as deluxe forms of *Space Invaders*!

Arcade adventures have always been popular. Who can forget *Repton*, the adventurous lizard created by Tim Tyler, who became a megastar after three sequels and many extra screens.

Starquake is also one of the best arcade adventure games to have reached the Acorn world, and ranks alongside *Citadel* and *Palace of Magic*.


The eternal Repton


Stryker's Run: a graphical adventure



Elite: one of the best ever


The Sentinel: had an original concept

Of the many text adventure games to have reached us, any Level 9 software is worthy of a mention, in particular *Emerald Isle* and *Worm in Paradise*.

The classics *Bored of the Rings* and *Hampstead* also add mega-spice to any games collection.

The first game to arrive from the new Soviet Union was *Tetris*, bringing with it originality, total addictiveness and useless graphics which, strangely, actually enhanced the brilliance of the game! The idea is to fit different shapes into an open-top box without creating any gaps. Simple, but sound.

In my opinion, the two best games ever on any Acorn machine are *Elite* and *Exile*. *Elite* prompted a giant response from all computer magazines and plenty of printed hints, cheats and features on game-play. The coverage of *Exile* was less favourable but undeservedly so.

Revs and *Aviator* made their mark in the hall of fame with the most accurate simulations of a racing car and aeroplane respectively seen on the Beeb or Elk. It is possible to identify a good simulator by trying to play it – if you can't it's good!

Superior Software deserves a mention for its commitment to the games market since very early on, and the Fourth Dimension deserves applause for almost single-handedly supporting the Archimedes market with some good stuff.

The best Arc games so far are probably *Zarch*, *E-Type*, *Terramex*, *Holed-Out!* and *Pacmania*.

What about the future? It would seem that the eight-bit games market is beginning to fade, though there is still plenty of mileage left in the old machines.

On the other hand, the Archimedes is gaining widespread support in terms of games and the A3000 is doing very well in this respect.

I think that BBC games will continue to trickle out for a few years, but 32-bit machines are becoming cheaper, and the games releases better and more frequent.

Inevitably, the Archimedes will take the model B's place just as the BBC micro did with the Atom.

Things may get worse before they get better, but the future looks bright.

Sam Greenhill



Thrust: a physical experience



Tetris: Soviet brilliance



GRAPHICS

From the first issue of *Acorn User*, virtually every month has seen some article or reference to computer graphics within its pages. Due to its (then) advanced graphics capabilities, the BBC micro became a firm favourite for computer art. Way back in 1982, Brian Reffin Smith from the Royal College of Art was producing computer art on his newly acquired Beeb.

Games have always been popular on home micros and have managed to remain so by keeping in line with the improvements in the machines' graphics capabilities. *Snapper* was one of the best home computer games of its type and closely resembled the arcade version. Nowadays, it takes the power and graphics of the Archimedes to come anywhere close to something resembling the sophisticated coin-ops of today.

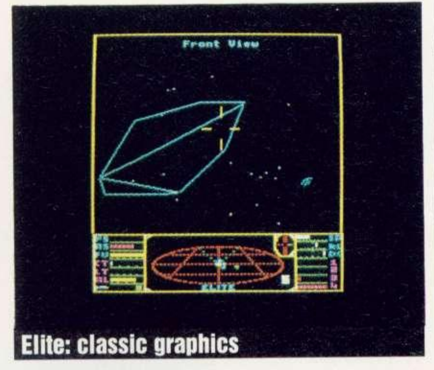
Due to the large number of games produced, a lot of graphics routines and techniques have been developed purely through game writing. 'Wire-frame' or vector graphics appeared on the Beeb in the form of the all-time classic, *Elite*. Solid or filled vectors now provide the ultimate in realism. The Archimedes' power is well suited for this and can be seen in games such as *Apocalypse* and *Interdictor II*.

When anyone mentions mathematics and graphics together, the words fractal and Mandelbrot always crop up. These days, they seem to be everywhere, but you should remember that *Acorn User* was one of the first publications to carry a relevant article. Mandelbrots first appeared in 1984, programmed for the BBC micro. Mandelbrot patterns that took eight hours to achieve on the Beeb can now be produced in roughly one second with four times the resolution and 16 times the colours on the Archimedes.

Graphics software and hardware has advanced in leaps and bounds. When the Beeb first took off, a popular means of inputting graphics was a kind of pantograph device that allowed you to trace simple shapes. Scanners that work in excess of 300 dots per inch are now required to exploit the new machines' resolution. Mice, once an option on the Beeb, are now standard issue on the Archimedes and are vital for the graphics interface or Wimp environment.

With the new hardware, it's now possible to produce near television quality (or NTQ) pictures. Digitisers can grab colour pictures live from TV and reproduce them almost perfectly on the computer monitor. It doesn't stop there either. Once captured, pictures can be stretched, rotated, or generally chopped up at will. What was only possible on large mainframes when the BBC micro was launched, is now an easy task for the A3000 – the latest machine to carry the Beeb label.

So, what could the future possibly hold?

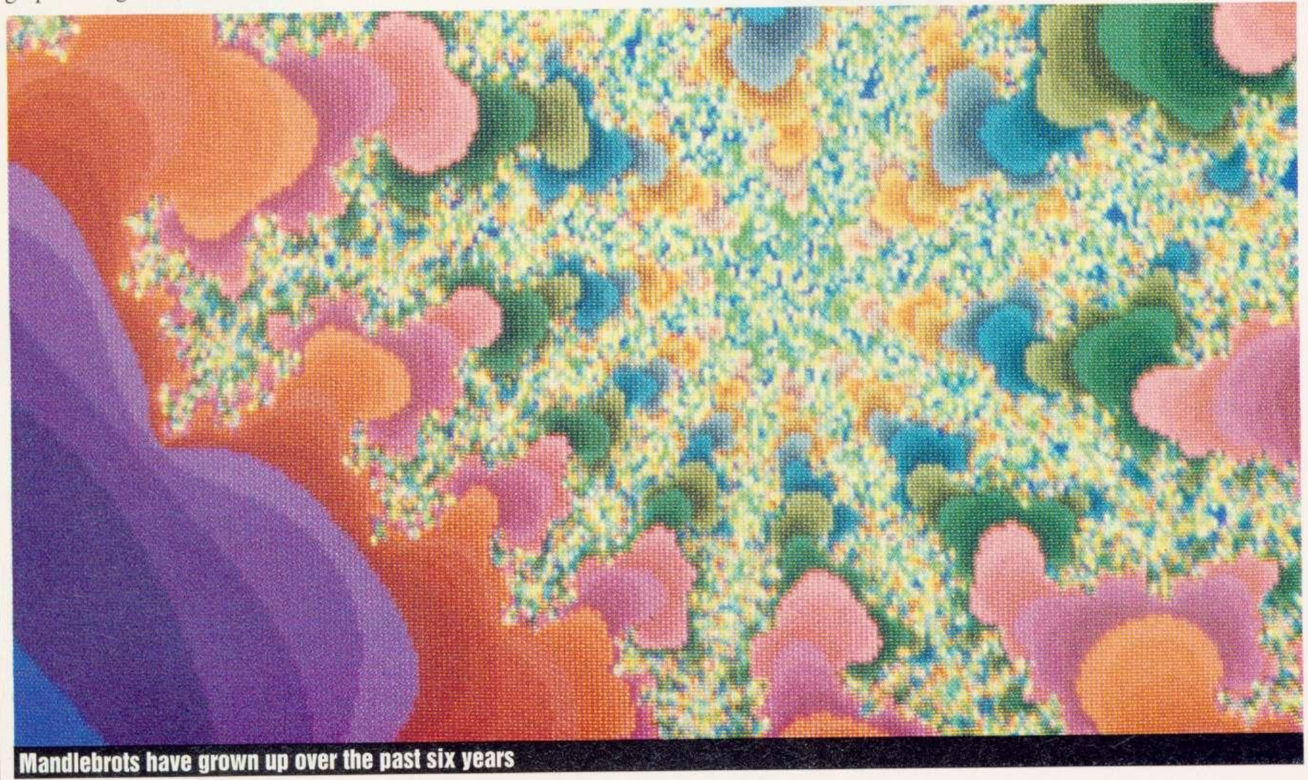


Elite: classic graphics

Continuing developments in Risc architecture mean that there will be a constant line of machines, each one faster than its predecessor. With more speed, you get more processing power, which in turn means better graphics. Both resolution and number of colours is likely to increase sharply in the future. Palettes of over 4,000,000 colours would be a perfectly sensible guess.

The next big breakthrough promises to be the interactive compact disc, similar to the Domesday disc on the Beeb. Thousands of images can be stored on one disc, using the computer to control the display of film sequences, perhaps mixed with computer generated graphics. CD-I (as it is known) should keep computer graphics going until the next great leap forward. Virtual reality with holograms? Who knows?

Rob Miller


Mandlebrots have grown up over the past six years





STOCK MANAGEMENT

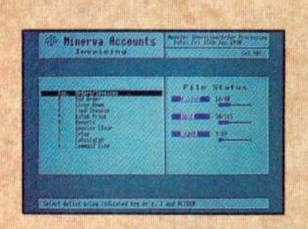
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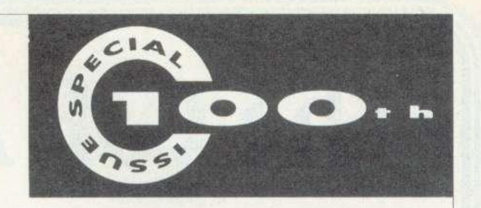
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MUSIC

The BBC micro was the first home computer with a usable sound system. Three sound channels, plus noise, was a novelty back in 1982. Suddenly, you could thrill to the strains of Bach and even use your computer to assist with music compositions.

It wasn't long before commercial music programs appeared. Remember Quicksilva's *Drumkit* or *MuProc*?. Chalksoft's *Note Invaders* put in an appearance and is still selling today and System Software released its *Music Editor* in 1984 for the princely sum of £9. In 1985 this was to develop into the Island Logic *Music System*, arguably the most sophisticated music editor for the BBC micro.

In 1984, The Music 500 appeared. Developed by Hybrid Technology and marketed by Acorn, it could produce 16 channels of sound and used a dedicated MCL (Music Composition Language) called Ample, which could perform more musical tricks than was previously possible.

By 1985 MIDI interfaces appeared. The UMI system from U-Music and EMR's Midi Track systems are still used today.

In 1986 a sampler appeared named after the developer – the Barry Box. The Music 500 became the Music 5000 and it was supplied with totally new front-end software, including a mixing desk and stave editor, which greatly simplified music entry and programming.

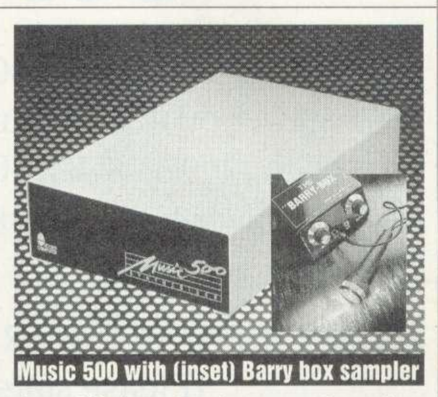
This was followed by the Music 4000 keyboard, the Music 2000 MIDI interface and the Music 3000 voice expander – in all, a system of great power and flexibility.

Throughout the years, the BBC micro became the *de facto* standard computer in schools and many software houses were busy beavering away producing dedicated music software for education. There are now over 50 such programs in regular use throughout the country.

The most recent music development came, again from Hybrid Technology, earlier this year – the Music 5000 Universal (see review in last month's issue). This will redirect the sound commands from almost all commercial programs to the Music 5000, thus overcoming many limitations of the BBC's sound chip and giving even the simplest programs a new lease of musical life.

It didn't take long for the ubiquitous EMR to develop music programs for the Archimedes. *Studio 24 Plus* was the first dedicated MIDI sequencer.

The speed of the Arc is ideal for sampling. Clares took advantage of that with the *Armadeus* software and sampling board.



Music 500 with (inset) Barry box sampler

Armadillo introduced a range of samplers, including one for the professional market.

In spite of the potential of the Archimedes as an ideal music computer, there have been problems getting MIDI to work under Risc OS and this has doubtless delayed developments of Risc OS-based MIDI programs.

The musical future of the BBC micro looks set to continue, especially in education, with the enormous support it receives from Hybrid Technology itself and third parties. The Archimedes, however, has yet to reach its full musical potential. Risc OS is a superb operating environment but we are still waiting to see a music software developer make full use of it.

Ian Waugh

COMMS

Many changes in the computer industry have happened since the launch of *Acorn User* in 1982. This is especially true of datacommunications. The Acorn range of computers has played a very important role in the growth of the UK comms market.

In 1982 Tandy and Apple computers were the most popular low-cost terminals. But that all changed with the launch of the BBC model A and B. Cheaper than the Tandy and Apple range, the Beeb took pride of place as being the most widely used machine among comms enthusiasts.

The reasons for this were simple. Besides its cost, the BBC micro features a number of screen modes that are particularly suitable for comms use. Mode 7 – teletext mode – is compatible with the Prestel viewdata systems (and others). And it can be argued that the Beeb helped boost subscriptions to the service in its early days.



The Gnome at Home has quality

Expansion has played a major role in the Beeb's success as a terminal. The model B was one of the first home computers to be sold with a serial port as standard. The RS423 port is a simplified version of its big brother, the RS232. Yet, it's more reliable in some respects.

Although the Beeb has a limited memory capacity, the comms software available for it is by no means sub-standard. Roms such as *CommSoft* and *Modem Master* boast features not found on packages costing much more: a cliche, but true none the less.

Modems in the early days usually came in the form of an accoustic coupler, and some terminal software that had to be loaded from tape. 300/300 baud was the maximum speed back then, and it took a few minutes to transfer a 20K screen image. Today, a 2400/2400 (v.22bis) modem with data compression and error correction providing an effective throughput of 4800 baud is common – and cheap at around £300-£400.

On-line services have progressed since the early days, with some of today's bulletin boards being of commercial quality. The Gnome at Home started life as a humble BB system in north London, and today is one of the most successful systems, with multi-user access, colour and user-editing. Many readers will be aware of the Ansi system which gives PC users colour and limited graphics when logged-on to PC boards. Well, Beeb colour boards were in operation as early as 1984.

The commercial services look a lot different now, from when they started. Telecom Gold in its early days had a subscriber base that consisted of comms enthusiasts – because they were the only people who could operate the system.

Today, Gold has over 80,000 subscribers, the majority of them business users. Services within Gold have multiplied over the years, and currently a subscriber can access over 30 databases from Telecom Gold's gateway menu.

The advent of the Archimedes has given the Acorn user access to PC based systems, as terminal software supports Ansi colour. Viewdata has grown up, and it is possible to purchase comms software that supports all the standards. In fact, no matter what demands modern day comms ask of the system and software, Acorn's latest range of machines will be able to cope.

David Janda

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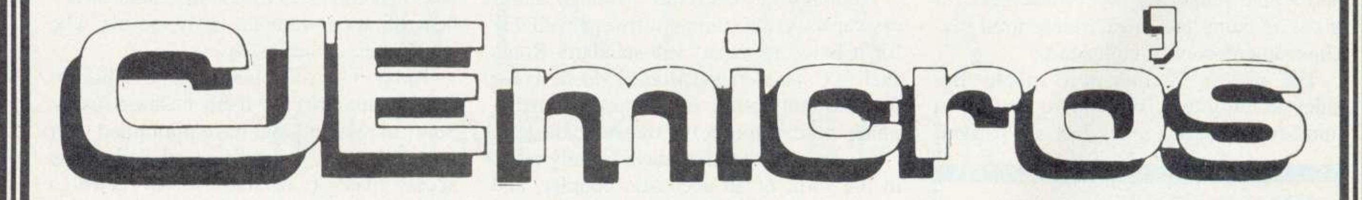
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BUSINESS

A look at how the Acorn family has developed in the business field over the last five years is startling: both hardware and software have attained a level that once we could not dream of but now take for granted.

Five years ago there were limits to the capability of programs and the amount of data which could be processed. Remember the four-page limit on letters?

More seriously, there were the memory storage problems, with severe limitations on how much data and code could be contained in active use at any one time. As a result we were learning to live with the problems and investing good money in add-ons to provide extra Ram. Many of these were ingenious and worked well.

Expansion worked two ways: adding to the memory with sideways Ram and moving up to ever more powerful disc drives which were faster, quieter and cheaper. As a result, the business user could extend the capability of the existing processor to meet more needs and obtain better value. Some went further, using second processors, although the cost and the problems of compatibility was always a deterrent.

Once you had a vast quantity of data at your disposal there was the difficulty of getting it onto paper with a printer.

The problem with printers was, and to an extent still is, one of compatibility. Every printer had its own codes and the manufacturers were competing to establish their own system.

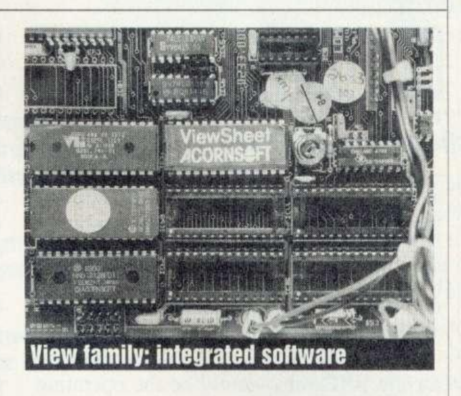
As a result there was a small industry engaged in selling manuals on how to use this printer with that software, and a variety of drivers of varying quality.

Everyone faced these difficulties and each new device brought its own peculiarities. How did we solve the problems? In the end, business competition did it for us by reducing the number of different items of equipment we could choose and producing total packages like the Compact, while the printers increasingly used the same codes.

We finally got what we needed – large resident memory, massive storage, standardisation of codes and powerful printers. Modems, communications and networks have all been added to make life easier.

The software front has changed equally, but more by refinement with new versions to match each processing development.

The most dramatic development was in integrating applications to give a suite of programs. The *View* family and the *View* group came to dominate the scene.



View family: integrated software

At one time, every month brought several major new items so dependable reviews could save money. In the end many of the smaller manufacturers and the specialists disappeared and with them some very good software which lacked the magic property of compatibility.

Many Acorn business users first used the old Beeb and moved up to Archimedes. The development of IBM compatibility has become more important, but there are many old machines still doing a sound job.

Perhaps the the need for accounts packages led users to more sophisticated equipment and software, but what can be achieved on even limited equipment is astounding.

Roger Carus

DTP

Desktop publishing has come a long way, but it wasn't until 1985 that the release of the Apple Laserwriter liberated would-be publishers from the chains of typesetting.

The BBC model B, the standard Acorn machine of the time suffered from two problems – a lack of memory in the vital high-resolution of screen modes, and no built-in mouse. So a double helping of DTP was a double miracle: *Fleet Street Editor* from Mirrorsoft and Advanced Memory Systems' *Pagemaker* (later called *Stop Press*) allowed seemingly amazing results.

Each allowed you to compose crude pages, A4, with columns of text and pictures. But they were used to create all sorts of publications – even tabloid-sized journals, by overlapping five A4 pages. This also served to disguise the problems caused by having to design the A4 pages as a mosaic of screen-sized chunks.

A couple of education packages also tackled DTP – in particular MAPE's *Front Page* and *Front Page Extra*, AVP's *Pixel Perfect* and Sherston's *Typesetter!*. All three have been used effectively in schools to introduce pupils to publishing practices. The AMX mouse, which came with *Pagemaker*, was certainly a catalyst for the development of DTP and Beeb graphics software.

Eight-bit DTP reached its zenith with Watford's *Wapping Editor*, a set of sideways Roms that can encompass page composition, graphics, font design. You can even add a scanner, to turn photographs and drawings into screen images, and scan them directly on to *Wapping Editor* pages.

However sophisticated the use of shadow Ram, sideways Rom and Eproms larger than 16K, the eight-bit world isn't big enough for 'real' desktop publishing. All the Beeb packages are essentially 'page painting' and are limited to tiny documents.

The Archimedes' arrival in 1987 opened up a new world – memory, a mode zero screen display (in 16 colours), speed, and the promise of real typefaces. But it took almost two years, and the arrival of Risc OS, for the promise to be fulfilled.

Acorn's *Desktop Publisher* is not the world's best DTP package. It's a port (from the Atari ST) of a clone (GST's *Timeworks*) of the second best (Xerox' *Ventura*) on the PC. But its value lies elsewhere: it laid down a benchmark for others to climb above. It was first, and it worked. It also showed up the need for 2Mb Arcs!

Computer Concepts' *Impression*, Beebug's *Ovation* (reviewed in this issue) and Clares' *Tempest* all exceed *ADP* in speed, capability and convenience.

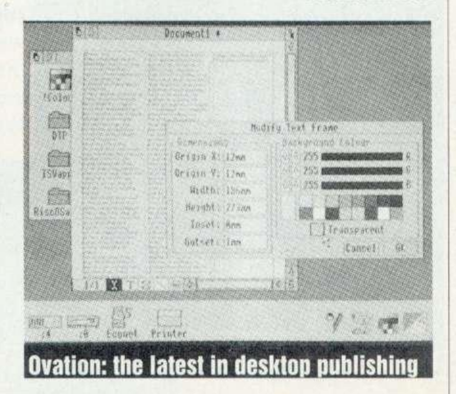
And the multi-tasking nature of Risc OS, together with Acorn's leading-edge font system, make the Archimedes an ideal DTP platform.

The emergence of desktop publishing has been a strongly democratising force – it has removed the professionals' monopoly on type and put the print medium in the hands of everyone.

The Beeb and Arc have a role to play here, as affordable computers that can produce results to rival other machines.

DTP has produced some evidence of 'design' gone wrong, but it's also turned up gems. And the Beeb and Arc are in the thick of it.

Graham Bell


Ovation: the latest in desktop publishing



PROGRAMMING

I think the BBC must be one of the main reasons for the popularity of the 6502. There can't be many BBC owners that don't know at least a little 6502 machine code. Perhaps the relative simplicity of this processor has something to do with the appeal of BBC programming. Certainly no other microprocessor has lasted as long or been pushed as hard as the 6502.

Two of the best pieces of programming for the BBC must surely be the operating system and Basic. Considering when they were written and despite originally being slightly 'buggy', Basic 1 and OS 0.1 are remarkable examples of what can be done in 16K. These days the Master comes with completely revised versions of these, but they're still essentially the same. BBC Basic has now become a standard and is used in schools all over the country. Versions are also available for PCs, Macintoshs and, of course, the Archimedes. Arthur 1.2 and Risc OS were also heavily based on the original BBC OS. Perhaps the ultimate in development of the 6502 is the Arm processor itself, as its instruction set is very similar indeed to the 6502 with obvious 32-bit enhancements!

More down to earth are the submissions that *BBC Acorn User* receives. Back in the old days, when people thought that REPEAT UNTIL was a pretty neat idea, most programs were short, unstructured affairs usually performing some very mundane task or demonstrating some very simple technique. Now, in these enlightened days of recursive procedures and such like, we see ray tracing, fractals and language compilers. Eight Bits is full of snappy machine code routines and the yellow pages are positively bursting with programs both complex and diverse; *Codename Druid*, windowing and image processing. From a personal point of view, in the years I have been writing for the magazine I have covered such topics as mazes, puzzles, sideways Ram utilities, disc filing systems, artificial intelligence and, most recently, data encryption to name but a few.

BAU programs: from 3-D life...

During my time as editor of the *BAU* games page, and indeed, prior to it, I noticed a definite increase in the quality of games and I don't just mean in the games themselves – the quality of programming and the techniques being used has been continuously improved. More and more has been squeezed into the BBC's tiny memory and instead of *Yellow River Kingdom* and *Jet Power Jack* we have *Firetrack*, *Exile*, *Revs* and, dare I say, *Repton Infinity*? Then of course there's *Elite*.

On the more serious side of computing, wordprocessors such as *Wordwise* have developed through *Wordwise Plus* to *View Professional*. *View* has begotten *View Professional* to *Pipedream* which is now available on the Archimedes, PCs and Z88.

It's easy to look back and think that 32-bit programming began with *Zarch*, but Acorn has quite a 32-bit history. The Arm appeared as a development system many moons before it was put in a cute box with a greek name. Earlier still came the 32016 second processor for the Beeb (and the Cambridge workstation – again built around the 32016). Largely aimed at lab specialists, these beasts broke benchmark records when I was barely out of short trousers.

It was the Arc that caused real excitement. It wasn't just a 32-bit processor – it was the 32-bit processor. I remember being awe-struck by an early version of *Lander*, *Zarch*'s precursor. I have no more vivid a memory of a programming quantum leap as of that first jump from eight to 32 bits.

The sheer speed of the Arm caused a great revival in 'doodles' from Mandelbrot sets to various 'automatons'. It's a number-cruncher's delight – as submissions to *BAU* show. Experimentation in graphics has also been intense.

Programming progress has followed a very different path in the 32-bit world than it did in the Beeb days. Then, it was a case of 'how much more speed can we squeeze out of this tiny box'. Now, speed and memory are readily to hand, attitudes have changed and 'environment' is the issue. Programs must 'harmonise' – be intuitive.

In some ways, Arthur, the original Arc operating system, represented the dividing line between old and new. It was based firmly on the knowledge acquired through the Beeb years but at the same time, attempted to tame the Arm's power. Then Risc OS appeared and everything changed. Some said Arthur should never have been – that Risc OS should have come earlier. I'm not sure the bridge from eight-bit single-tasking to 32-bit multi-tasking could have been crossed in one stride.

With Risc OS, programmers are subject to many restrictions of conformity. This has generally led to high quality packages that are good neighbours in the same machine. Manuals become less and less important to the user who increasingly relies on intuition. I expect this trend will continue. Large applications like Computer Concepts' DTP package *Impression* have set a high standard. But the rules of the desktop environment do make it harder for software writers to show their own style.

The Arc made a big impact in terms of languages. Basic V is a dream and certainly silenced critics of interpreted languages. As far as I know, there have always been more languages available on Acorn machines than any other micros and it's good the Archimedes has continued the tradition.

Gone perhaps are the days of radical departures from the norm, and giant leaps forward. I remember seeing *Elite* running on a Beeb for the first time and thinking 'how can this be possible?'. Now it's old hat too, but I doubt I'll ask that question again for a while.

There'll be progress but, I fear, not the same shock of the new. Times change.

Dave Lawrence



...to a complex mega-game

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Timetable of events

THURSDAY AND FRIDAY

11.00 - 11.50 am
CD ROM IN EDUCATION
Speaker - *A spokesman for Next Technology.*

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12 NOON - 12.50 pm
SCHEMA - A SPREADSHEET FOR THE FAMILY
Speaker - *David Clare.*
He has worked in the computer industry for more than nine years and is best known as the head of one of Acorn's longest standing third party software houses, Clares.

VOUCHER WORTH £30 for Schema

1.00 - 1.50 pm
IMAGE PROCESSING
Speaker - *Malcolm College.*

VOUCHER WORTH £40 for Wild Visions V9 Digitiser

2.00 - 2.50 pm
PC EMULATING AND OTHER OPERATING SYSTEMS
Speaker - *Ian Lynch.*
An expert on a variety of operating systems including IBM's PS2, MS dos, Unix and Risc OS, he is the curriculum development director for the City Technology Colleges Trust. In this role, he is responsible for supporting and developing curriculum innovation within colleges throughout the country

VOUCHER WORTH £30 for Acorn PC Emulator

3.00 - 3.50 pm
MUSIC-MIDI-MANIA
Speaker - *Mike Beecher.*
A graduate of the Royal College of Music, he is the managing director of ElectroMusic Research.



4.00 - 4.50 pm
RISC TECHNOLOGY IN THE 1990's
Speaker - *Mike Muller*
A key memberof the Acorn Risc development team.

VOUCHER WORTH £25 for Programmers Ref. Manuals

5.00 - 5.50 pm
DESKTOP PUBLISHING
Speakers - *Martin Chappell and James Lynn.*
Martin Chappell is the Art Editor of Car Magazine, the largest publication of its type in the UK.
James Lynn is one of the chief designers and programmers on the Impression development team at Computer Concepts.

VOUCHER WORTH £30 for Impression 2

SATURDAY AND SUNDAY

11.00 - 11.50 am
HYPERMEDIA FOR ALL
Speaker - *David Tee.*
The author of two of the original programs on the first welcome tape for the BBC Micro, he is the man behind the Genesis project.

VOUCHER WORTH £20 for Genesis

12.00 noon - 12.50 pm
SCHEMA - A SPREADSHEET FOR THE FAMILY
(See details as for Thursday and Friday)

1.00 - 1.50 pm
PROGRAMMING MADE EASY WITH BASIC 5
(Including Dabs Compiler)
Speaker - *David Atherton.*
A co-founder of Dabs Press, he is well known as a regular contributor to leading computer titles.

VOUCHER WORTH £30 for a Dabs Press ABC Compiler

2.00 - 2.50 pm
PC EMULATING AND OTHER OPERATING SYSTEMS
(See details for Thursday and Friday)

3.00 - 3.50 pm
MUSIC-MIDI-MANIA
(See details for Thursday and Friday)

4.00 - 4.50 pm
FASTER COMPUTING - *all the expansion options for the Archimedes*
Speaker - *Alex Van Someren.*
The technical director of Aleph 1, producers of the first commercially available ARM 3 upgrade, he will demonstrate the full potential of the Archimedes and discuss future possible enhancements.

VOUCHER WORTH £50 for Arm 3 upgrade

5.00 - 5.50 pm
DESIGNING DOCUMENTS WITH THE HELP OF A COMPUTER
Speaker - *James Lynn.*
A leading light in desktop publishing technology, he is a chief designer and programmer at Computer Concepts.

VOUCHER WORTH £30 for Impression 2

Getting to the conference

Getting to Wembley Conference Centre is easy. All roads leading to the site are well signposted and the Centre is well served by buses and the tube (Jubilee & Metropolitan lines).

Conference registration

Complete the registration form below. Sessions are priced at £7.50 each on Thursday and Friday and £5 each on Saturday and Sunday. Or buy a "Rover ticket" and attend all sessions - £30 per ticket for Thursday or Friday - £15 per ticket for Saturday or Sunday.

Entrance to the Computer Shopper Show at the door is £5 for adults and £3.50 for under 16's, but for Acorn conference delegates only we are offering a reduced rate at £3 per adult and £2 per child. "Rover ticket" holders get in free!

Tick the boxes to indicate which sessions you will be attending:-
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Thursday/Friday 6 & 7 December

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- ☐ Schema - A spreadsheet for the family
- ☐ Image processing
- ☐ PC emulating
- ☐ Music-Midi-Mania
- ☐ Risc technology in the 90s
- ☐ Desktop Publishing

Please register me for the following sessions @ £5 each.

Saturday/Sunday 8 & 9 December

- ☐ Hypermedia for all
- ☐ Schema - A spreadsheet for the family
- ☐ Programming made easy with Basic 5
- ☐ PC emulating
- ☐ Music-Midi-Mania
- ☐ Faster computing
- ☐ Designing documents with the help of a computer

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ADDING IT UP

It would be very difficult to deny that the BBC model B was designed for expansion. In 1981 when the machine first appeared, most home computers had a mains socket, a couple of jack plugs for a tape recorder and a TV output. If you were lucky, there was sometimes a rather suspicious looking edge connector dubiously labelled 'expansion' and that was it. Imagine the shock then of upending Acorn's New One and finding no less then five of the things lurking underneath with such names as '1MHz Bus' and 'Tube' not to mention the veritable abundance of widgets on the back. Needless to say, Acorn and numerous third party developers set to work to produce every conceivable add-on you could want.

In most cases add-ons have become smaller, faster, more sophisticated and cheaper. Take disc drives for example. The first official Acorn drive (full-height) was expensive and could store 100K on a 5.25in disc. These days you can pick up a one-third height 3.5in drive for around £60 capable of packing 640K onto a disc. Printer technology has progressed rapidly from the Epson FX80 and Olivetti Inkjet through NLQ and LQ to Laserjet and Postscript compatible laser and LCD printers. With the capabilities of today's dot matrix printers, it is not surprising that daisywheels are now almost entirely extinct.

This expansion has not remained simply external – that very unassuming beige lid can hide some very unusual secrets. Sideways Rom boards, Ram boards, Shadow Ram, 128K paged Roms, real time clocks, double density filing systems, Econet boards, colour enhancers, turbo boards, Kenneth Kendal, the list is endless. You can now even expand a standard BBC up to the full Master specification. And if all this enhancement was not enough you could always add a second 6502 to speed up processing, a Z80 for CP/M compatibility, an 80186 for IBM compatibility or even an Arm for developing Archimedes programs!

Back on the outside, any non-typists could get to grips with mice, trackerballs, graphics tablets, touch screens or even a Quinkey! If you've ever played *Aviator* a set of Acorn joysticks were almost essential (but little use for anything else) while *Elite* had a special option to play with the Bitstik – the world's first '3D' joystick.

Although scanners are only a recent addition to a range of peripherals (probably due to the Archimedes), video digitisers have been around for a number of years – old slow scan ones being particular fun for creating weird and wonderful pictures.

Then there's the more specialised equipment – speech recognition systems, weather satellite receivers, external graphics boards such as the Prisma3, the BBC Buggy and the whole range of turtles it inspired, and finally my personal nomination for the best BBC peripheral – the Music 500/5000.

I've only had enough space to touch the surface of what has been available over the last 100 issues. The number of new add-ons has definitely diminished, although I think it will be a long time before it fades altogether. With the arrival of the Archimedes range of computers, most companies are shifting their attention to developing 32-bit peripherals. However, while the BBC still exists and people use it, there will be a market for add-ons.

Unsurprising that the designers of the Archimedes wanted it too to be as versatile as the Beeb. Thus, 'podule' entered common usage and we haven't looked back.

One of the first to take the Arc into new territory was Armadillo with its eight-bit sound sampling card. Sampling was hitherto restricted to the professional studio. Now Armadillo even makes 16-bit stereo samplers and the boom in home computer music has brought forth other welcome add-ons such as MIDI interfaces.

Video digitisers have also been a popular accessory with users. They were available for the Beeb but inevitably the Arc's higher resolution display and improved range of colours would take things further. DTP on the Arc increased users' thirst for imported images and this contributed to the appearance of image scanners – first from Computer Concepts and, later Irlam Instruments. The monochrome originals are now joined by a colour Irlam scanner.

Many add-ons that delighted Beeb owners were pretty much old hat by the time the Arc came along. Certainly though, more and more people are acquiring items that only the rich and professional users had access to before. Hard discs are bigger and cheaper and so all the more popular. I expect the pattern will continue, with higher and higher capacity storage media at lower and lower prices. Already you can get a 560Mb optical drive if you really need one. One of those plus a digitiser and you might store an entire episode of Grange Hill if you wanted. 'CD-Rom' is also a buzz word (or two). Now, courtesy of Next, you too can save your data on nice shiny discs and have your own ones pressed at a snip. All a far cry from 100K 40-track discs.


Adding to the Master

Second processors were a key Beeb feature and the Arc's floating point co-processor continued the idea. The Arc has enough speed and memory for most uses, so second processors never became as important, but the arrival of the Arm 3 from Aleph One as a slot-in replacement for the original Arm caused quite a stir. The speed improvement is staggering and so it has to win my vote as 'most exciting add-on'.

At the specialist end of the market, things have been lively too. Companies like Wild Vision have brought out a lot of video products (framestores and the like) to bring the Arc into competition with wildly expensive industry equipment. This is good to see. And, in labs throughout the land, I'm sure there are wireheads attaching goodness-knows-what to the Arc. Atomwide, supplier of the original prototyping expansion card and other cunning widgets has done a great deal to ensure that the tradition of expandability has continued with the Arc.

This has been important, as the Arc was never a home computer like, say, the Atari ST. (It's all right, I had my fingers crossed when I typed that.) A new place in the market had to be carved requiring expansion possibilities and the innovation of many companies, large and small.

David Atherton



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PRINTERS

When people first started using micros, they wanted to print out what they had on the screen.

That hasn't changed, but the methods of printing certainly have.

In those days, the most common printers, outside of university computing departments, were daisywheel machines. These were used extensively by the increasing numbers of accountants and other commercial users.

Daisywheel machines then were large, noisy, slow and very expensive – much as they are today. In 1983 Fujitsu's ads 'proudly' presented 'the fastest daisy in its field' the SP830.

Capable of 70 characters per second (that would have been fast for a daisywheel, although in practice it never managed it) it was a snip at just £2000.

For mere mortals, a Smith Corona TP1 would cost 'only' £550 and manage an earth-shattering 11cps. Chances are, the first long document printed with that would just be finishing now.

Of course dot-matrix printers soon made an appearance. To start with they were not very complex. In those days nine-pin machines were quite a status symbol.

Most people managed with eight pins and all characters with 'descenders' (such as p, g and q) were raised up to get their dangling bits in.

The first 'real' dot-matrix printer to make an impact was the Epson RX-80. This was the forerunner of the now famous FX-80 and it offered nine-pin printing at up to 100cps (about 50cps in practice) for just over £400 (and that was back in the days when a pint of best would set you back about 60p).

Epson soon established the control code system used in the RX-80 (and its astoundingly fast replacement the 160cps FX-80) as the *de facto* standard.

It was wonderful. It could print in bold, underlined, condensed, and... er... that's about it.

Lots of other companies followed suit and soon the homes of Britain, having just taken the plunge with a BBC model A or B, were investing in their very own Shiwa CP80, Star Gemini 10X or Seikosha 100A – all costing around £250.



Epson RX80: grandmother of them all

In 1984 Epson sneakily launched the Epson LQ onto the market. Nobody took much notice, as it cost £1300, but it featured an early version of NLQ – near letter quality printing.

This was an infringement of the Trades Descriptions Act if ever there was one, but it caught on none the less.

The first NLQ printer to make the connection with Acorn users was the Kaga KP-810 (Kaga soon changed its name to Taxan, as it was trying to break into the Spanish market and Kaga is not a very pleasant word in Spanish).

The KP-810 was amazing for its time. It could print at 140cps in the normal (now called 'draft') mode and at about 30cps in the relatively attractive NLQ mode.

Acorn users bought these machines in droves and soon software products designed especially for them appeared from Watford Electronics and CJE Micros.

By 1986 just about every new dot-matrix printer was an NLQ model but a new trick had been invented to separate micro users and their money.

Now the manufacturers were putting 24 pins in the printheads of their dot-matrix printers to get the NLQ results at draft speeds.

To start with, Acorn users pooh-poohed the whole idea and kept buying nine-pin NLQ machines. It wasn't until half-way through 1987 that the bastion of the Acorn printer world, Watford Electronics, thought there was sufficient mileage in 24-pin printers to advertise them.

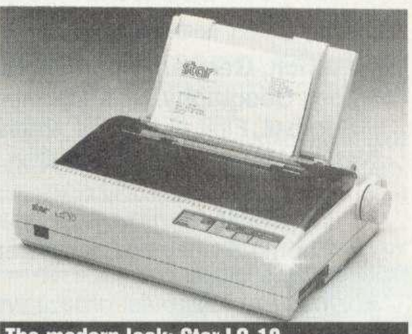
Even today, many Acorn users go for nine-pin machines, although they are not even that much cheaper anymore.

Excellent 24-pin printers such as the Citizen Swift 24 and Panasonic KX-P1124 cost less than £400 and offer infinitely better quality and many more features than the old RX-80 at much the same price.

One reason that nine-pin machines have remained popular is that they have steadily improved over the years and decreased in price too. Today printers such as Star's LC-10 II and Mannesmann Tally's MT81 offer fantastic value for money.

Of course, while all these revolutions were happening in the dot-matrix field, a much bigger revolution was happening elsewhere.

Just as the first daisywheel printers were simply automated typewriters, so someone at Hewlett Packard had the bright idea of automating a photocopier. The laser printer was born.



The modern look: Star LC-10

Laser printers didn't really enter the Acorn world until the Arc, and Risc OS in particular, arrived, although early ones were to be found on big networks in a few schools, shared among the Beebs and Masters.

Laser printers offered at a stroke all that dot-matrix designs had been (and still are) striving for – near perfect quality, total flexibility and high speed.

To start with they were very expensive. It still costs around £1300 to buy a reasonable machine. However, for professional work, laser printers are the future. Already two 'direct drive' machines are available especially for the Archimedes. Perhaps more of this type of printer will appear in years to come.

Standard laser printers will probably come down further in price, or get faster and cheaper to run.

Currently, all personal laser printers offer 300dpi resolution. That's bound to increase with 600dpi designs finding their way down from the professional end of the market. Colour laser printers will also surely become available, eventually for much more reasonable prices.

However, dot-matrix printers will not fade away altogether. Epson has already produced a 48-pin printer and Star a rival which imitates it with just 24 pins. Eventually such printers will be the norm.

Other printing methods may also come to the fore. Inkjet technology is fast gaining recognition with the Canon BJ130 and the HP Deskjet.

Other techniques almost unheard of in the Acorn world may find a mass market appeal in the years to come – hot wax thermal printers, electrostatic printers and ion deposition machines.

By the time you read the 200th issue of *BBC Acorn User*, not only the latest Acorn micro will have changed, but there's a good chance the printer connected to your micro will be capable of producing print as good as this magazine, in full colour and all for less than the price of an Arc.

Malcolm Brown



UTILITIES

Utility programs, whether programmers' tools or just extra commands to make life easier, have always been popular on the BBC micro, more so than on most other computers, whether games or business machines.

The wide range of uses for the Beeb, and the exceptionally large proportion of BBC users who do their own programming have provided a ready market for utility software houses.

Because of space available, I have only scratched the surface of a cornucopia of innovative ideas in software development – my apologies to anyone omitted.

The first BBC utilities were cassette-based, but these were quickly replaced by disc and Rom-based programs, many of which offered dozens of extra 'star' commands to the BBC operating system.

Programmer's utilities were evident right back in 1981 with *Exmon* from Beebugsoft. This machine code monitor appeared in

```
>VDU14
>*H.FILE

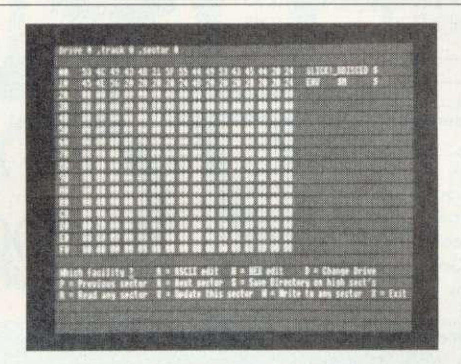
MEGA ROM 1.00
  CLOSE
  SCRAMBLE <filename> <password> <<filena
me>>
  UNSCRAMBLE <filename> <password> <<file
name>>
  FREE <<drive>>
  FORMAT <tracks> <<drive>> <<track>>
  VERIFY <tracks> <<drive>> <<track>>
  SECTLOAD <address> <track> <sector> <<s
ectors>> <<drive>>
  SECTSAVE <address> <track> <sector> <<s
ectors>> <<drive>>
  FSFIND <string> <start track> <end trac
k>
  FBFIND <start track> <end track> <byte>

  EDSECT <track> <sector> <<drive>>
  REPAIR <track> <<drive>>
  MRELOC <filename>
  ALTER <filename> <load> <exec>
  CHECK <filename> <filename>_
```

cassette, disc and finally Rom format, and became one of the standard machine code programmer's development tools.

Another early player was System Software of Sheffield with its *Spy* debugging tool, and *ADE* macro assembler, the only assembler of note to appear on the BBC, as the built-in assembler made this difficult to sell. Computer Concepts produced a monitor called *Gremlin*, although this never had the same success as its disc toolkit, *Disc Doctor*.

For Basic programmers, many attempts were made to provide an enhanced development environment, such as *Toolkit*, containing extra Basic editing commands and *Sleuth*, a Basic single-stepper from



```
5024 A0 00     ..  LDY #&00
5026 A2 00     ..  LDX #&00
5028 86 86     ..  STX &86
502A 18        .   CLC
502B A1 82     ..  LDA (&82,X)
502D 48        H   PHA
502E 38        8   SEC
502F E5 86     ..  SBC &86
5031 51 80     Q.  EOR (&80),Y
5033 38        8   SEC
5034 E5 84     ..  SBC &84
5036 81 82     ..  STA (&82,X)
5038 68        h   PLA
5039 85 86     ..  STA &86
503B E6 82     ..  INC &82
503D D0 06     ..  BNE &5045
503F C6 85     ..  DEC &85
5041 30 9A     0.  BMI &4FDD
5043 E6 83     ..  INC &83
5045 C8        .   INY
5046 C4 84     ..  CPY &84
5048 D0 E0     ..  BNE &502A
504A A0 00     ..  LDY #&00
504C 4C 2A A0  L*. JMP &A02A
_
```

Beebugsoft. Of particular note was *Brom*, from leading Archimedes firm Clares Micro Supplies. Like *Toolkit*, this provided a Basic editor, improved renumbering, searching and replacing and so on, but also provided quite a few general and disc-related commands.

Acornsoft, never strong on utilities, nevertheless provided the very good *Basic Editor*, the foundation of the Basic editor on the Archimedes, and a rather quirky full macro assembler system.

The first disc drives on the BBC were rapidly followed by a host of disc utilities, mostly on Rom, such as *Disc Doctor*, which were immensely successful as they all provided, amongst other things, the essential FORMAT and VERIFY commands which Acorn left out of the Disc Filing System (DFS) Rom. *Disc Doctor* provided these commands, plus dual catalogues and a disc sector and memory editor.

Watford Electronics went one better and produced its own DFS with all these items included. The ultimate programs in this field are the *Advanced Disc Toolkit* (*ADT*) and *Advanced Disc Investigator* (*ADI*) published by Pres, which provide everything you need when working with discs.

Because many of these Roms conflicted with each other in the machine, one utility contained in virtually every Rom was an ability to disable other Roms!

Over the first few years, the tendency was to repeat the same old ideas, and some enthusiasts might have as many as half-a-dozen memory editors and formatters fitted to their machines.

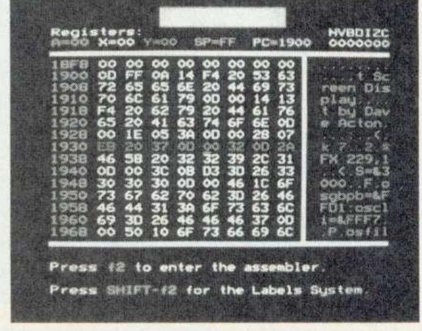
In more recent times, there has been a tendency to produce less technical utilities such as printer control Roms, spelling checkers, teletext screen designers and so on.

There is little prospect of much more general utility software appearing for the BBC, although several areas such as hard disc backup, 24-pin, colour and laser printer support and automated file salvage are still poorly catered for after 10 years. Specialised areas such as Econet and control work are the fields in which future utility material will be found.

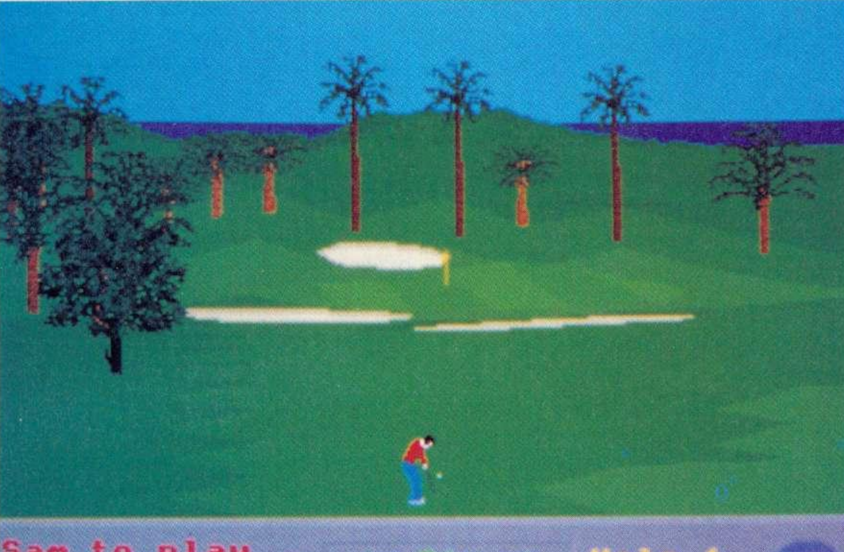
Of course, on the Archimedes, there are many utility ideas not yet produced as robust programs, but from a personal viewpoint, I have generally found the Archimedes user to be less interested in 'hacking' à la BBC, and more geared towards practical productivity. Perhaps this is just a sign of the maturity of the market as a whole, or it may be that the 1990s technology will do so much of interest at a high-level (real-world quality graphics and sound, enormous Ram and disc storage) that the pursuit of esoteric technicalia is a fading art.

David Atherton





GAME SHOW



Microdrive: a golf simulation with true 3D contours

From an arcade point of view there were only three real powers at the *BAU* show last month. Clares sold all its copies of *Interdictor II* by Saturday morning – not even half way through the show! The Fourth Dimension demonstrated *Chock's Away*, its Tiger Moth flight game with a two player option. It's not so much of a simulation as a game, indeed I completed the first mission on my first flight – it's that easy, though later on I gather it's not! It's quite slow but it looked very good, especially the outside view of your biplane.

The other attraction at the show was from Eclipse Software, which was showing off its first two games for the Archimedes: *Worldscape* and *Blowpipe*, the latter of which was previewed in *BAU* earlier this year. From what I could make out (review copies are not yet available) *Worldscape* is bang up to date, none of this old fashioned space stuff. Save the world from CFCs, the greenhouse effect and industrial pollution is the theme, and it has a similar concept to *Sim City*. It should be available now: Eclipse is on (0243) 531194.

Cambridge International Software (*Fireball II*) has been busy lately. *Microdrive* appeared out of the blue a few weeks ago to add to the growing pool of Archimedes golf games. CIS isn't calling it a game but a 'simulator', and perhaps fairly so. This is the first golf game to incorporate 'true' 3D contours; it is object orientated, so hills have bulk and balls roll down them. Also, you operate the golfer's limbs instead of a power meter. *Microdrive* was available at the show, along with a memory game called *Memory Magic* and *Minipack 5* – a compilation of *Pon*, *Fish!* and *Fireball II* for under £30. CIS is on 071-833 4023.

I now know of two BBC emulators for the Archimedes which will run *Elite* and *Exile*. Copyright problems mean prospective publishers are a bit wary, but more than one has said it's looking for a solution. The one I saw at the show ran *Elite* about three times too fast and even Acorn was amazed. I gather the author made himself a quick killing over a bet with disbelieving Acorn personnel!

The *Apocalypse* cheat featured in the July 1990 issue only works with version one of the game, points out Ewen Roberts of Littlethorpe in Leicestershire. For version two owners Ewen has come up with another solution: place a backup copy of the planets disc in the drive and type the following:

```
X%=OPENUP"HST" FOR T%=0 TO
8:INPUT#X%,a%,b$,c%,d%,e%,f%:
NEXT PRINT#X%,8 CLOSE#X
```

By the way, version two is no different in play to version one.

A mega *Exile* help series begins in the January issue, so close your eyes if you still want to try and complete it yourself. If not, prepare yourself for fun!

See you next month!

Sam Greenhill

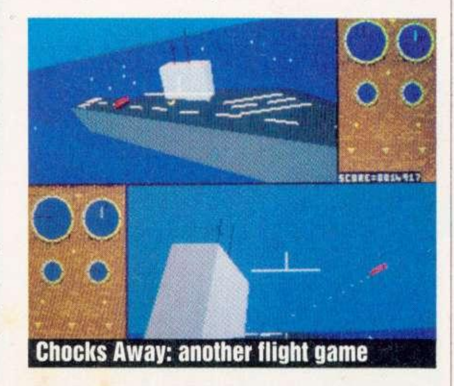
Sporting Triangles

CDS Software. Tel: (0302) 340480.
Archimedes £24.95

Sporting Triangles is based on the TV game show, which is basically a sporting trivial pursuit. An incredibly tedious and uninterruptable intro theme tune paves the way (why do people insist on using the waveforms supplied by Acorn? The wavesynth-beep drives me bananas!).

Up to three players can take part, at least one of whom must be flesh and blood. The computer controls the remainder, offering abilities from average to brilliant. Throws of a die determine who goes when. The die doesn't really roll, instead it performs odd gyrations accompanied by a strange squeaking sound. After this, the players select the sport they understand the most (I do anyway). The range is quite large, certainly enough to offer variety.

On to the main playing arena, the 'studio'. The graphics are ponderous, if not crude, but at least they're in colour. Something I did like were the different costumes the players appear in, appropriate to the sport they'll be cheating at. Each individual is asked a question on a randomly chosen topic. The computer then asks you the



Chocks Away: another flight game

relevant question, and you're supposed to yell out the answer before a counter stops. You then select whether you did, or did not, get the question right!!

Question-and-answer sessions continue in this mould, swapping between quick-fire and multiple-choice. *Sporting Triangles* is best played with friends and frankly this is the only bearable way. But that's not really the point. The point is that the software costs £25, includes irritating sound and mediocre graphics, doesn't exploit much disc space and really needs more than one person for it to make a passing attempt at being fun. For trivia, stick to boards at parties.

Richard Browning

Klax

Domark. Tel: 081-780 2224. BBC cassette £9.99, disc £14.99

It's nice to see software that doesn't involve killing anything that moves. Now *Tetris*, the famous Russian puzzler, has started a whole flood of games for the 90's.

Klax appears to be a hybrid version of *Connect Four* and involves catching different coloured tiles which slide down a ramp and dropping them into a grid to form lines (or Klax's) of three or more. Diagonal lines score more points, as do lines of more than three tiles. 'Wild' tiles can be used as any colour and allow two lines to be linked.

The idea may sound simple but it doesn't take long before your paddle (the thing you catch tiles in) fills up and new tiles start dropping out of reach. Three lives are awarded at the start of each game and a dropped tile counts as one life lost. If you can't use the tiles in your paddle, you can always flip them back up the ramp, but they always fall back down, causing even more panic.

Graphics in *Klax* are in mode 5 and because of the restriction in colours, it can be difficult to distinguish tiles from the background. Perhaps a sideways Ram version that worked in mode 2 would have been easier. Aside from that, the graphics suffice under the circumstances and don't really detract from the overall game. Sound is minimal yet functional.

Klax certainly scores in the originality stakes and is definitely one of those 'one-more-go' type of games. Thoroughly recommended for those who prefer speed, addiction and a (non-violent) challenge. An Archimedes version is rumoured to be in production with all the features of the 16-bit versions, including doubles for two players. Thank you Domark for stepping out where others fear to tread!

Rob Miller

Ballarena

Sisteme, 4 Rue De Massacan, 34740 Vendargues, France. Tel: (01033) 67 70 53 97. Archimedes £19.95

It's no secret! It's *Breakout* with a new twist. Instead of the bat being confined to the bottom of the screen you can skirt around the playing area in a huge sweeping circle, which makes this game interesting in its own right. But it has been crafted so well that its atmosphere really takes you in.

From the little man dragging the *Ballarena* banner across the score table to the beautiful array of bricks to be wiped out, *Ballarena* never fails to make you step back and admire its design. Gameplay isn't bad either. You battle to keep your ball, straying off the edge of the screen, while aliens obstruct its path. As if this wasn't enough – you have to collect the power-up tokens that spiral out from the 'vanishing point'.

With two players it becomes even more involved as you either help each other out or concentrate on knocking your opponent out of the area by deflecting his ball.

Each screen consists of blocks that range from old tin cans to hub caps, and at times I was reluctant to blast them away, but then I remembered that another work of art was waiting to be admired on the next level. After every four levels comes a challenge stage. Here your bat is equipped with a laser and you have to destroy streams of aliens with a wanton blood lust to gain points. Frustration really comes into play if another player is trying to do the same, since the bats don't pass over each other here – you have to ram your 'partner' out of the way!


Ballarena has a captivating atmosphere

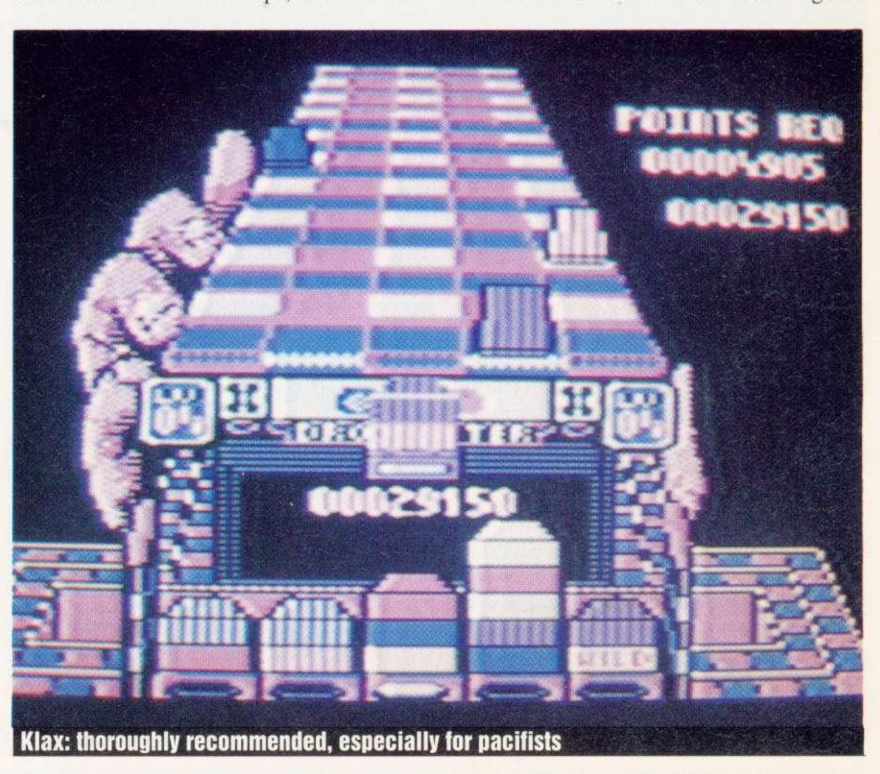
To conclude, *Ballarena* shows style, even if it isn't too original. It's a game of top quality and the guys that produced it show an enthusiasum for the Arc that makes me very glad to own one. Take my advice, buy this game – you won't be disappointed.

Paul James

Starch

Alien Images. Tel: 061-773 8632. Archimedes £14.95

Your name is Dave and you have a problem. Your boss is worried about the figures



Klax: thoroughly recommended, especially for pacifists

and the staff aren't meeting their targets. The boss's friend Sam is after your job. Answer? Work your office job during the day and at nightfall don your overalls in preparation for hard labour.

This is the story behind *Starch*, the game about laundry managers working the giant industrial washing machines at night to keep their jobs. You control Dave. Harry, your mate, can be either computer or human controlled. There are five areas to get to grips with in the laundry and on each the workload quota must be reduced to zero.

On level one a couple of levers operate a small wooden trolley, which trundles to and fro between two tables. It is on these tables that bags of washing fall from protruding metal chutes, and on this trolley that you must stand in order to get to the washing. Easy enough, but that's without the evil Sam's sabotage attempts on your work.

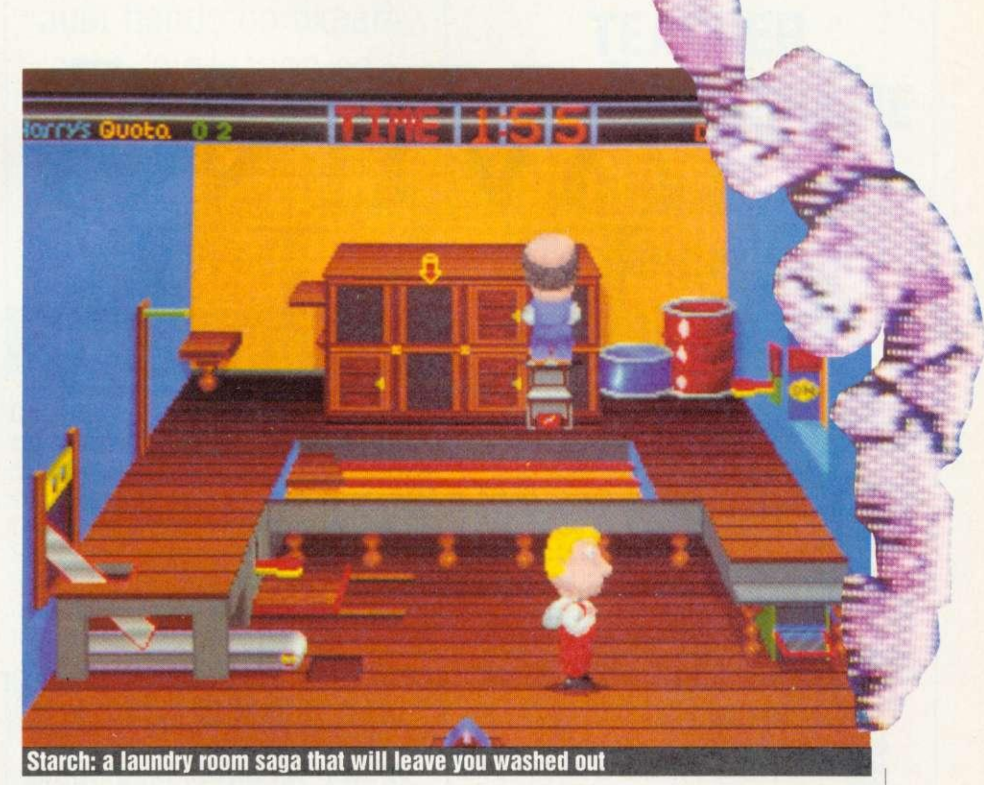
Half the fun of *Starch* is working out the function of all the switches, levers, pedals, buttons, handles, pull-chains ... I could go on forever. In the locker room there are conveyer belts, sliding panels and platforms on rails.

Computer controlled Harry is schizophrenic. Sometimes he is a right stubborn ... so-and-so. He will get in your way and steal your washing. On other levels he's a push over – you can have him do all the work and collect all the credit. *Starch* is best played in two-player mode.

When the time runs out the boss says 'Harry, well done'. Harry jumps for joy. If Dave failed, he says 'Dave, you're fired!' in a lovely Lancashire accent, and Dave falls through a trap door operated by the gleeful Sam.

Well, what can I say? The graphics are absolutely fine, first rate. Speech is nicely done, and the music is good, though it would be nice to be able to switch it off sometimes! *Starch* is original, buy it.

Sam Greenhill



Starch: a laundry room saga that will leave you washed out

Interdictor II

Clares. Tel: (0606) 48511. Archimedes £34.95

'This is your captain speaking. We are now aboard the latest *Interdictor* aircraft model and are flying at approximately 5000 feet. Passengers are advised that some bumpy manoeuvers will shortly follow and may wish to secure a tight hold on their seats. Also, if any of you happen to notice a missile on our tail please advise the captain by screaming very loudly.'

And so to battle we fly. The *Interdictor II* flight model is more accurate and more dangerous than its predecessor. The ground detail has been considerably enhanced, with features in every direction, and the game is very difficult to complete. But for those of you who found *Interdictor* too hard there is now the option of 'flying brick mode'.

In this you can do anything, slow or fast, without worry of crashing (you bounce off the ground) or being hit. Driving down the motorway is perfectly possible in the brick, and shooting Porsches with rockets is sadistically pleasing.

Interdictor II has a square scenario with accompanying map. Capturing one of the nine airfields would not be too hard if it weren't for the Hercules transporters that parachute trucks in behind you, thus undermining your own bases. The enemy is supposed to be more intelligent, and it is to a great extent, though fighters don't appear very adept at evading your shots once you're on their tails. One shot and they spiral down to earth, smoke pouring from the rear.

There is too much to describe here, but I will say that complainants of lack of ground detail in the original should have no problems here. The 50-polygon ship has to be seen to be believed. The sound though, is identical to *Interdictor*.

Flying brick mode is brilliant. I use it as a way of relieving my frustration when I fail my mission in simulator mode. I just switch over to brick and go hunting for the cause of my failure! The simulator itself seems more accurate and the authors certainly think so. Stalls are more common when you try dodgy manoeuvers. Oh, and a panoramic view is now available via the keypad.

Problems? Well, using the space bar to swap into brick mode cancels the ability to save state, quite rightly so. But if space is accidentally pressed before you save, and I've done it, your whole mission is lost. However, looking at *Interdictor II* from a game point of view I love it.

The original *Interdictor* wasn't very good in my opinion and I'm pleased that my two major complaints have been well fixed, namely ground detail and the ease of completion. But the 'Second Mission' is hard – those damn Hercules'!

The price may put many off, so perhaps Christmas is the time to buy. But for me, that is too late. I will be buying it now.

Next month, check out our interview with the authors of *Interdictor II* and find out who they are and how they wrote it.

Sam Greenhill


Interdictor II: a pilot's dream

HAVING A BALL

PAUL JAMES has a chat with the authors of Ballarena

If you've recently walked through an arcade then you will be aware of the high standard of graphics and sound on some of the coin-ops these days. If you've ever wondered how these games are programmed and what hardware is used, then next time look a little closer – if you see the word 'Sisteme' on the console, it could well be the Archimedes doing the work. Sisteme is a company based near Montpellier in the South of France. Founded in 1985 by a Mr Gros, it services, provides parts and builds cabinets for coin-op machines.

In the same year Mr Gros met up with Francois-Yves Bertrand, a 19-year-old computer science student from Montpellier. Francois had an Electron and some experience with 6502 machine code. Mr Gros asked Francois to produce a game that could run on the Electron.

The idea was to take a bare PCB, add some expansions and then place it in a cabinet. Francois wrote the game and the first mock-up cabinet was produced. However, this machine never made it onto the market due to lack of interest from the dealers.

Francois left Sisteme and began working with the company that helped start up the Minitel system. However, in 1987 he returned to Sisteme, after receiving his first Archimedes – only four days after its launch.

Francois immediately saw the potential of the machine and wanted to do the same thing that had been done with the Electron two years previously.

As he had to go into the army for national service, he proposed a friend to take his place. Fredric Nespoulous was also a computer graduate and when Francois returned from the army in 1988 Sisteme had given the go ahead for work to begin on the new Risc-based console.

The hardware was developed, the standard Risc chip set was supplied directly from manufacturers, VLSI, the only enhancement being 8Mb of Rom for the software, extra graphics and sound.

Meanwhile Fredric, a music enthusiast, met Franck Pierre, also a keen musician.



Frederic, Francois and Franck – 3FR

Franck was a professional graphic artist and he joined Francois and Fredric to form a programming team. They called themselves the 3FR. The scene was set – three friends who had one thing in common, to produce a game to run on an 8Mb Archimedes for the coin-op market.

A game called *Virus* was the first project and although it never saw the light of day, it gave the three valuable experience in producing games and working as a team.

To produce their games the three use a standard Arc as a work tool. Francois works mainly on the idea behind the game and the main pieces of code. Fredric and Francois literally re-wrote the operating system with benefits such as speed and memory savings on their side. For instance, their sprite routines are over twice as fast as the Risc OS SpriteOp system calls.

Meanwhile Franck concentrates on the graphics, using Pineapple's colour digitiser and several art packages to help him. He doesn't have programming knowledge, but being a graphic artist he loves using the Archimedes for his work.

Fredric programs the music. To catch sounds he uses Armadillo's eight-bit sampler and Sisteme's own 14-bit version. He is no mean programmer with titles such as EMR's *Rhythm Box* under his belt.

Their latest project is *Ballarena* (see Game Show for review). It has taken nine months to produce and in its arcade version occupies around 2Mb of memory. So far Sisteme has sold around 300 cabinets, mostly in the USA.

The big benefit for all us Arc owners is that not only is the machine being used in this way, but Sisteme has also started to produce versions for 1Mb machines. To do this, the authors remove unessential items like title pages and superfluous tunes and then they compress the graphics.

Next time you're in an arcade look for the word Sisteme, and remember that you don't have to put 50p in the slot – you could go home and play it on your Arc!



Ballarena is a top quality game that has style



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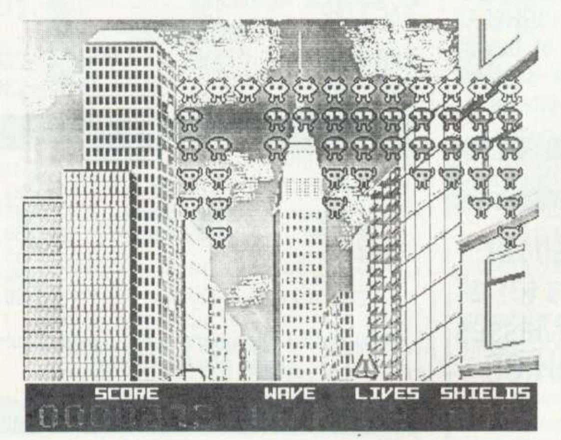
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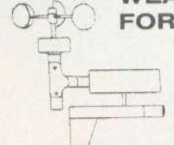
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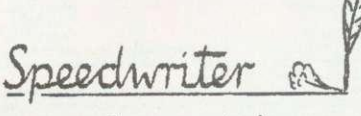
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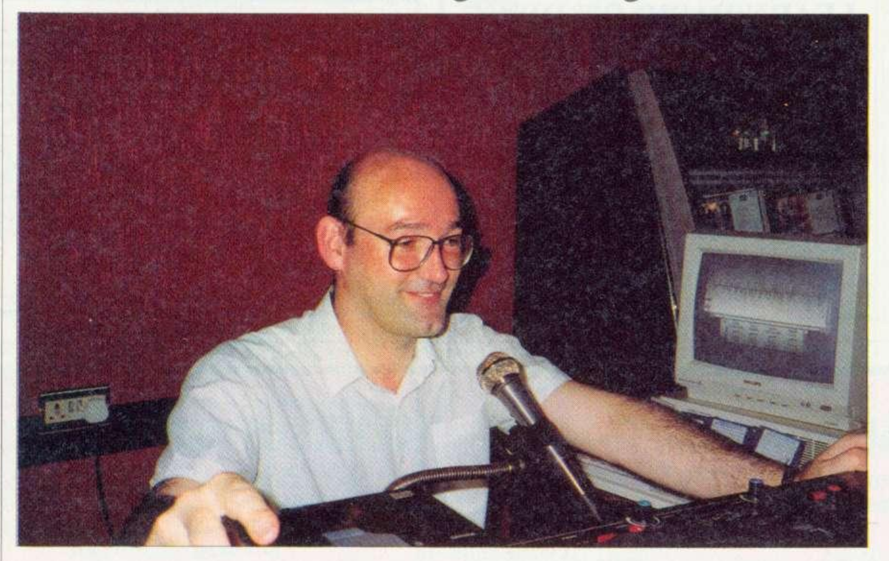
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'See that?' He points to the Arc 410 alongside an assortment of speakers, record decks and wires. 'All he does is tap a few keys on that wee computer, and he finds any song you can think of. Amazing'.

Tom Waller acknowledges the man's admiring gaze with a smile. The regulars at Murdo's seem to regard him as a computer genius. His regular oldies' night every Tuesday finds him playing hits from yesteryear minutes after they've been requested. The locals put their requests on a form, giving the code number of the song from Tom's catalogue of hits. Some challenge him to find an unusual song from the post-war era, but if it was a hit, he'll find it.

Despite this seemingly impressive talent, Tom is the first to admit he is no computer expert. More accurately, he just happened to discover the right computer (he claims he's the only DJ to locate records this way) at a time when storing the details manually was becoming impossible.

A popular local DJ for the past two decades, Tom has appeared at various hotels and bars, formerly worked for Radio Clyde, and now works for North East Community Radio. His record collection has grown with his experience. Yet until a few years ago, details of his 5000 records were stored on ordinary address cards.

'I used index cards with a code number for each song', he recalls. 'I just about coped until I did a six month residency at a truckers club and the lads there grabbed the cards and threw them back all mixed up. It was impossible to put them back as they were'.

Indexing the code numbers in a book also proved impractical so Tom decided that the only way to store details of his collection was to put them on a computer.

At the time, he was employed during the day as a service engineer for Grampian Health Board, where Beebs and Masters were used in the Physiotherapy department. Although his job involved repairing the machines, he was impressed by their ability to withstand some very tough treatment.

'The computers were being used to help stimulate patients with limited physical control', he says. 'They got a terrible pounding from people who were sometimes having epileptic fits while sitting at the keyboard. I thought if they could survive that, they could certainly stand being shifted around from one night to the next'.

Initially, Tom bought a secondhand BBC B and entered details of his collection in *View*. This took a large slice of his summer holiday, so you can imagine how he felt when a friend pointed out the details could be more easily accessed on a database!

'I originally did it in *View* because it had the search facility. Then someone showed me the *Viewstore* database, and how it could sort, select and search by an index.

Undaunted, Tom re-entered the information on the database. This enabled him to locate a random request simply by typing in the name of a song. Alternatively, if the listener wanted to hear a particular artist but couldn't remember the name of the song, he could enter the artist's name and a list of their hits would appear on the screen.

Tom later switched to a BBC Master but has since progressed to the Archimedes.

'When I saw the add-on podules you could slot into the backplane of the 410, I was hooked. But it was only when I got the machine that I realised how fast it is. Building index files on a BBC Master takes about seven hours on a normal 5.25 inch disc drive. On the Arc, it takes 22 minutes'.

In addition, the Arc has proved useful for other tasks. Tom uses it for jingles with Clares' *Armadeus* software. By slotting in a disc, loading it into the sound sampler and hitting ESCAPE, he can trigger off jingles that he has 'turned inside out so that even the artists wouldn't recognise them'. Not only has this helped with his discotheque, but also with his radio work.

'I did a two hour special on the history of Abba for North East Community Radio', he recalls. 'I needed 20 seconds' backing music that I could talk over. So I used their hit *Ring Ring*, which has a 15 second introduction, and repeated it in the sound sampler. I wouldn't have been able to do something like that 10 years ago'.

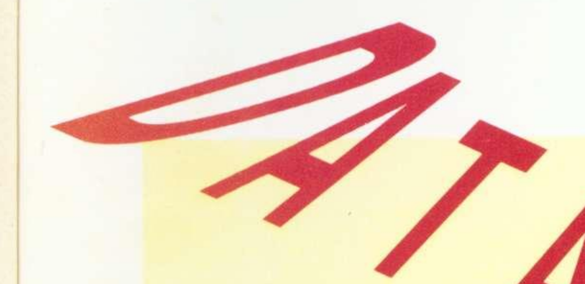
Overall, Tom is glad that he turned to a computer. But is there anything he would like to change about his equipment?

'My only complaint is that no one has made *Viewstore* run on the 32-bit machines. At the moment, I'm using it on the Arc via the emulator, but if someone released an Arc version, I'd buy it immediately'.

Visitors to Aberdeen who want to check out the nightlife could well find themselves strutting their stuff next to the Archimedes! But be warned: it may be ideal for locating requests but it does little to improve the dancing of the locals at Murdo's!

DESKTOP OFFICE

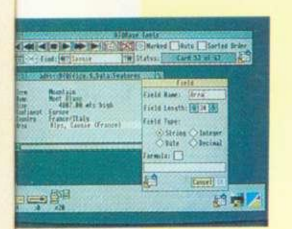
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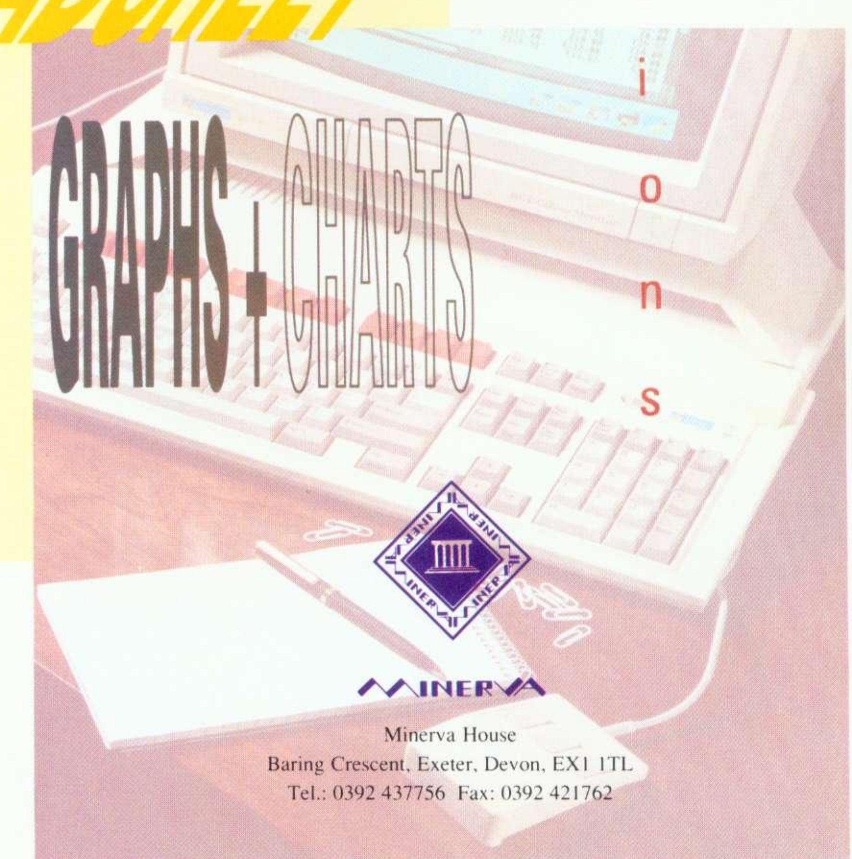
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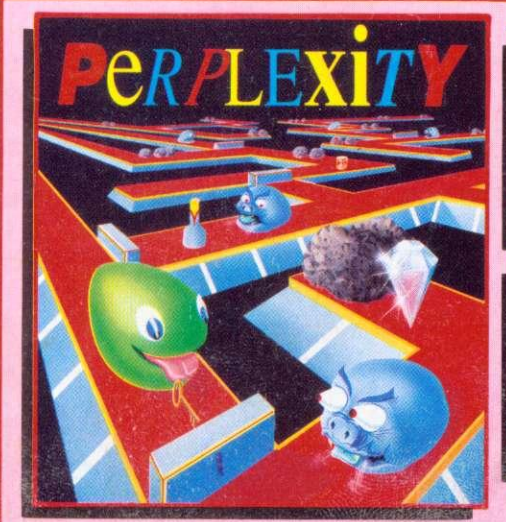
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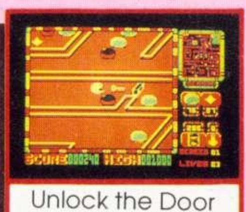
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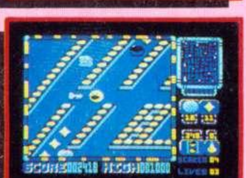
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